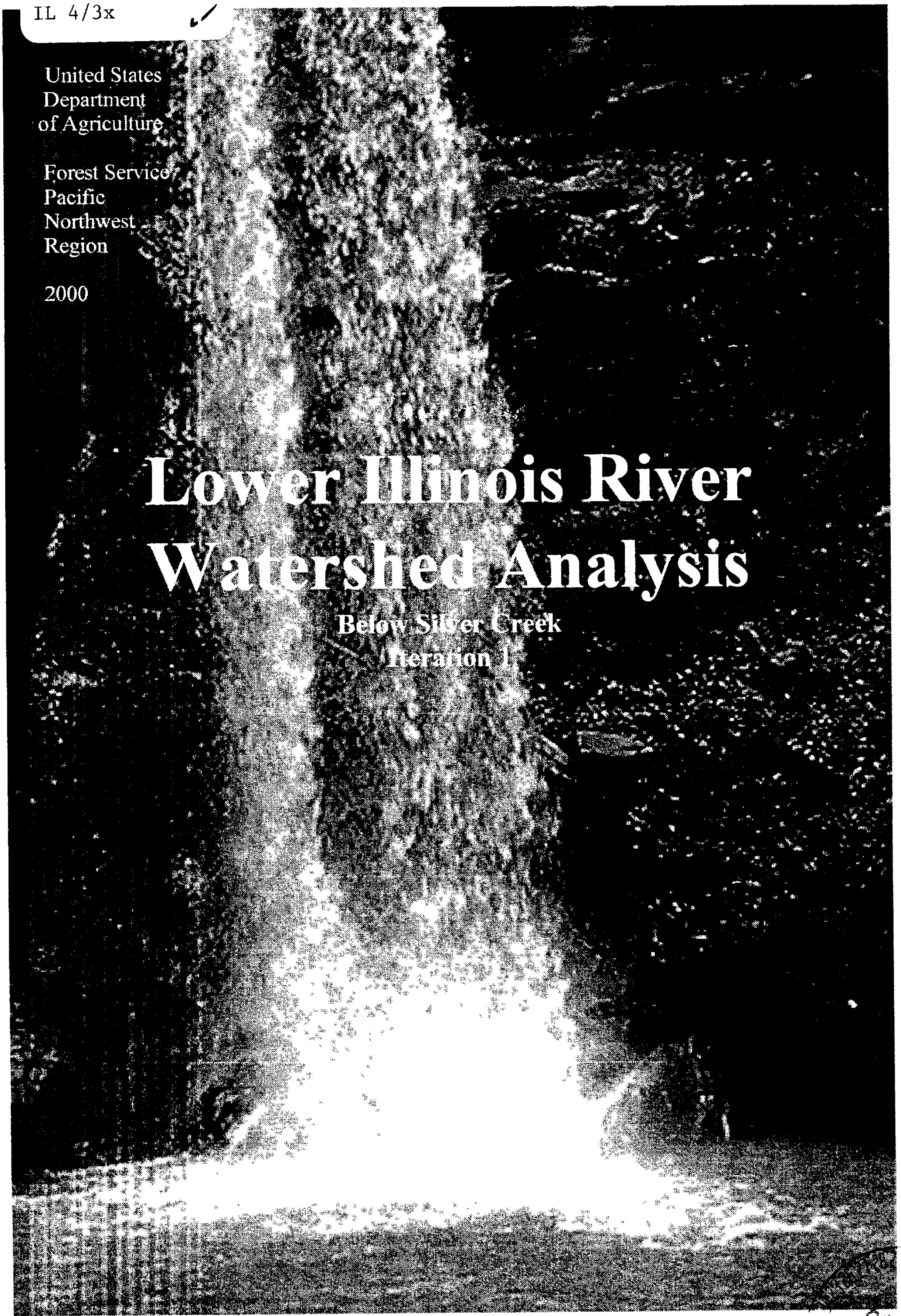

United States
Department
of Agriculture

Forest Service
Pacific
Northwest
Region

2000

Lower Illinois River Watershed Analysis

Below Silver Creek

Iteration 1

I have read this analysis and find it meets the Standards and Guidelines for watershed analysis required by the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994).

Signed_______________________________ Date_______________________

District Ranger
Gold Beach Ranger District
Siskiyou National Forest

Cover Photo Fall Creek on the Illinois River
Photographer Connie Risley

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INTRODUCTION

The Lower Illinois River Watershed Analysis (below Silver Creek), Iteration 1.0, was initiated to analyze the aquatic, terrestrial, and social resources of the watershed. The watershed analysis was completed by an interdisciplinary team using the six-step process outlined in *Ecosystem Analysis at the Watershed Scale (Version 2.2, August 1995).* The analysis includes the entire defined portion of the watershed, but focuses more detail on National Forest land. This document has the following components: the aquatic ecosystem, the terrestrial ecosystem, and social aspects.

The information gathered and analyzed will be used to guide future resource management, and ensure that Aquatic Conservation Strategy objectives and other Standards and Guidelines contained in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994) will be met on Federal lands.

Illinois River Basin

The Illinois River is a major tributary to the Rogue River in southwestern Oregon. The Illinois River Basin contains approximately 984 square miles, nearly 20 percent of the Rogue River Basin. It is located primarily within Josephine and Curry Counties in Oregon, and includes a small portion of Siskiyou County in northwestern California. (See Vicinity Map and Site Map.)

Lower Illinois River Watershed

This portion of the Illinois River watershed includes the Illinois River from the mouth of Silver Creek, but not including Silver Creek, to the mouth of the Illinois River at its confluence with the Rogue River near the town of Agness, Oregon. All streams entering the Illinois River between these two points with the exception of Indigo Creek, and the land drained by those streams, are included in this watershed analysis. (See Table 1 and Land Ownership Map).

Table 1. Land Ownership

Ownership	Acres	Percent
USDA Forest Service	38,741	94
State of Oregon	370	<1
Josephine County	22	<1
Private	2021	5
Total	**41,154**	100

Management Direction

Direction for management of the National Forest land is provided by the Siskiyou Land and Resource Management Plan (LRMP, USDA, 1989) as amended by the Record of Decision and Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl (ROD, USDA and USDI, 1994). Management areas for National Forest lands within the Lower Illinois River Watershed are listed in Table 2 and on the Management Areas Map. The definitions and management strategy for these areas can be found in the ROD and in the LRMP.

The area addressed by the Lower Illinois River Watershed Analysis includes the Lawson Creek watershed, which was designated as a Tier 1 Key Watershed in the ROD. Detailed information concerning this watershed may be found in the Lawson Creek Watershed Analysis (WA), Iteration 2.0 completed in 1997. There are no other Key Watersheds within the Lower Illinois watershed. One other Watershed Analysis covers a portion of this analysis area, Horse Sign Creek WA completed in 1998. Lawson Creek and Horse Sign Creek are included in overall data and watershed descriptions, but are not analyzed in detail in this document.

Table 2. Management Areas

Management Area	Acres	Percent
Wilderness	274	<1
Wild River	1,855	5
Botanical	968	3
Unique Interest	444	1
Backcountry Recreation	10,444	27
Supplemental Resource	1,187	3
Late-Successional Reserve	15,123	39
Special Wildlife Sites	311	<1
Scenic/Recreation River	231	<1
Riparian Reserves	1,267	3
Retention Visual	493	1
Partial Retention Visual	1,343	4
Matrix	4,801	12
Total	**38,741**	100

The US Geologic Survey (USGS) divided the United States into hydrologic units codes (HUC) according to the river system the land drains into. The USGS assigned numbers to the first four 2-digit fields. This Watershed Analysis area lies within the Hydrologic Unit Code 17100311, defined as:

Field 1	17	Pacific Northwest Region (primarily Oregon, Washington, and Idaho)
Field 2	10	Oregon-Washington Coastal
Field 3	03	Southern Oregon Coastal
Field 4	11	Illinois River

Other agencies have further divided these HUC watersheds into subwatersheds and smaller drainages. Agencies are moving toward a single set of boundaries and watershed numbers. At the time of this analysis, the subwatersheds included have different numbers assigned by the U.S. Environmental Protection Agency and the U.S. Forest Service.

Table 3. Subwatersheds

FIELD 5 EPA	FIELD 6 EPA	FIELD 5 USFS	FIELD 6 USFS	EPA NAME	STREAMS	FIELD 7 USFS
11		07		Illinois-Lawson		
	01		M		Bluff Creek Black Rock Creek Forest Creek Horse Sign Creek Ethel's Creek Nancy Creek Old House Creek Fox Creek Fall Creek	Portion of 10 Portion of 10 Portion of 10 06, 07, 08, 09 Portion of 05 04 Portion of 01 03 02
	02		L		Lawson Creek	All

KEY FINDINGS

Underlying **geologic structure** strongly controls the direction of stream channels and influences the type and location of erosional processes. Tightly folded and deformed bedrock, highly fractured and sheared zones along fault traces can be a focus of landslides. Examples include large, north-trending debris slides and debris flows in the tributaries near the mouth of Silver Creek, numerous slides and ravel in Fox Creek on the northern margin of an active earthflow, which itself delineates a faulted and sheared zone between sedimentary rock and serpentinite.

Most large, **ancient landslides** are related to both underlying geology and possibly to the more tropical climate that existed during the last glacial period. More recent failures tend to be smaller in size, and are concentrated within the margins of the more ancient.

The lower mainstem Illinois River is an important **fish migration** route, allowing access between the sea and important spawning tributaries. In the lower Illinois basin, important spawning tributaries are Lawson, Indigo and Silver Creek. The small tributaries offer very little spawning or rearing habitat.

The Lower Illinois Watershed provides a diversity of **recreation opportunities** including camping, hiking, rafting, recreational driving, mountain biking, motorcycling, horseback riding, hunting, catch and release fishing, wildflower viewing, and botanical study. The primary area where recreational activity occurs is the Illinois River corridor.

Both the presence and absence of **fire** have shaped the vegetative characteristics and habitat for dependent wildlife species within the watershed. Studies indicate that natural fire occurrence probably had moderate return intervals, primarily low to moderate intensity, and random events of high intensity burning. It is generally accepted that Native Americans used fire as a tool of sustenance. The advent of European settlement was likely to have increased the frequency, size, and intensity of fires in the watershed. Beginning in the 1940s **fire suppression** began to reverse this trend, with policies to stop all fires at the smallest possible size. Ecological signs indicate that the absence of fire as a natural disturbance agent is leading to conditions more prone to higher severity fire, while creating less diversity across the terrestrial landscape. Present day policies have opened the door to allow fire to play a more natural role, once studies are completed and plans have been drafted.

AQUATIC ECOSYSTEM NARRATIVE

GEOLOGY

Illinois River Basin

The Illinois River basin lies entirely within the Klamath Geologic Province, a very old accretion of volcanic and sedimentary rocks that have undergone tectonic deformation and alteration. The Klamath Province extends from northern California through southwestern Oregon. It consists of late Jurassic and early Cretaceous-aged north-trending arcuate belts of rocks, bending convexly to the west. The oldest rocks are in the eastern portion, with progressively younger rocks to the west. The rock formations are considered to have been part of a continental margin along which an oceanic plate was subducted. Portions of oceanic floor, including what are interpreted as upper mantle material (ophiolite suite) and volcanic arc sediments were added, or accreted to the continent (Ramp, 1979). Overlapping the older rock types are Eocene marine sedimentary rocks associated with the Coast Range Geologic Province. Folding and faulting are part of the accretionary process in an active subduction zone. In the Klamath Province, east-dipping faults have thrust older rocks over the younger rocks. These were subsequently offset by prominent north-south trending normal faults and shear zones, and then by northwest trending cross faults.

The headwaters of the Illinois River have their origin in the Siskiyou Mountains near the border between California and Oregon. The terrain through which the river travels has been interpreted as an uplifted remnant of a broad plateau, now eroded into rugged and mountainous landforms . The geomorphology of the mountains, valleys and stream courses reflects the underlying rock types and tectonic history. More easily eroded rocks in the area such as mudstone erode into rounded hills, while harder rocks such as gabbro form sharp resistant ridges. The analysis area has numerous faulted contacts between and within rock types. The patterns of the faults strongly influence stream course and gradient, especially where rock types of different hardness are juxtaposed.

Illinois River and Tributaries below Silver Creek

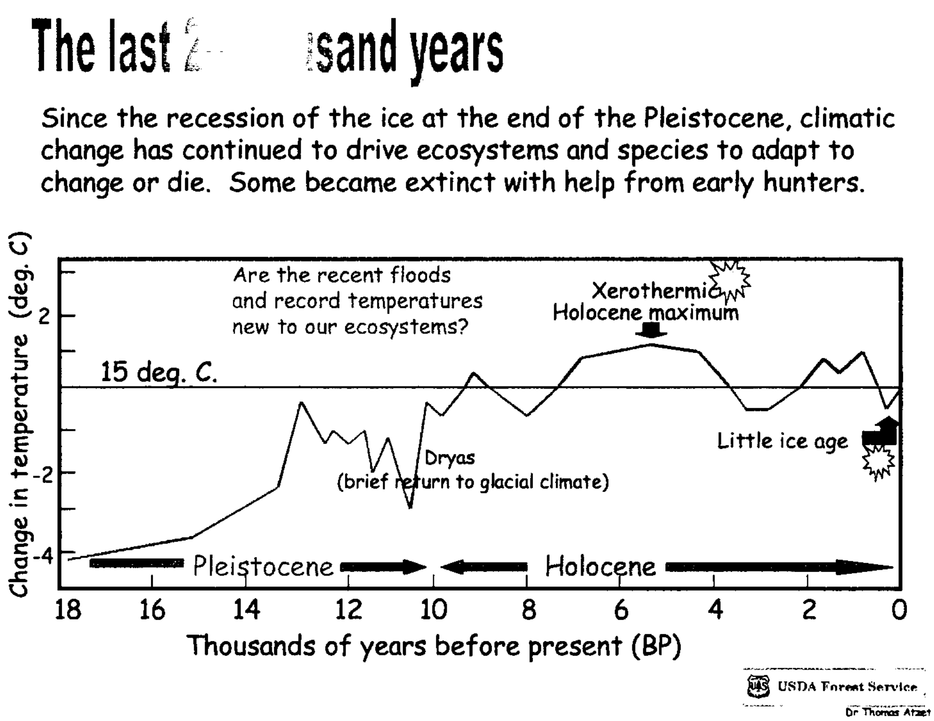
Formations of the Western Jurassic Belt are exposed in the watershed analysis area that provides a representative slice of the complex terrain that is the Klamath Geologic Province. The following section outlines a brief description of the rock types, typical soils that are derived from the different rock types, and a general slope stability description. A geologic map for the analysis area was compiled by using DOGAMI geologic maps for Curry and Josephine Counties , DOGAMI map of the Agness quadrangle, and aerial photo interpretation. Slope stability mapping was done using aerial photos from flights in 1997 and 1986 with spot-checking of photos from 1969.

Quaternary unconsolidated alluvium and fluvial deposits (Qus): Geologically recent alluvial, terrace and landslide deposits consist of unconsolidated sand, silt, and gravels deposited by water or erosional processes. Mineralogy is dependent on the source material. Material deposited at Oak Flat or at the mouth of the Illinois River will have come from diverse sources from all along the course of the river. Humans have long used the terraces in the watershed area for settlements, pasture, and agriculture. Soil development tends to be minimal and droughty on these deposits. Deeper, productive soils have developed on several of the higher and more ancient terraces, possibly accelerated by organic material from crops and livestock. However, because of position on the lower slope and poor consolidation, alluvial deposits are prone to stability problems caused by undercutting from streams, roads and building sites. Surface erosion and landslides can also be triggered by groundwater saturation or by concentrating surface water runoff.

Tertiary Lookingglass Formation (Tmss): The Lookingglass Formation consists of thinly interbedded mudstone and siltstone with minor conglomerate. These rocks are exposed near the mouth of the Illinois River in the headwaters of Fall and Nancy Creeks. The rocks have been down dropped along the Coquille River Fault, a high angle normal fault. Least resistant to erosion of all the rock types found in the analysis area, it weathers to gentle hills and swales, creating a unique plateau area in the upper slopes of Nancy Creek. At the slope break into the Illinois River canyon, however, streams can rapidly cut through the bedrock. Where runoff has been concentrated by road drainage and former clear-cut harvest, the streams are deeply incised with shallow debris slides and short debris flows in the headwalls. This is compounded by the interbedded mudstones, which tend to perch groundwater, leading to piping failures and headward erosion of draws and channels.

Soils developed on Lookingglass mudstones range from shallow (< 6 inches) to very deep (40 to 60 inches). They are primarily Ultisols, formed from clays that weather out of the mudstone parent material. Most Ultisols develop under moist conditions in warm climates; in the analysis area these conditions were created by a combination of the underlying bedrock and a legacy from the more Mediterranean-type climate that existed approximately 4 to 8,000 years ago.

Figure 1. The Last 20 Thousand Years



Lookingglass soils tend to be droughty, highly weathered and acidic because of shallow depth to bedrock or argillic horizons formed from clay accumulation. Oak savannas and meadows found on the upper slopes of Fall Creek are typical vegetation types for Lookingglass mudstones in the analysis area.

Cretaceous marine sedimentary rocks (Km): Cretaceous rocks in the area consist of unmetamorphosed marine sandstone and conglomerate. They can be correlated with the Humbug Mountain and Rocky Point Formations to the north, and may be erosional remnants offset between the Coquille and Mountain Well Faults. Cretaceous sediments in the analysis area underlie mid and lower slopes of Fall, Fox, Old House, Nancy and Ethel's Creek drainages. Slopes are moderately to very steep. Shallow debris slides, rock falls and rock and soil ravel are common on steeper slopes. The mainstem of the lower Illinois River is deeply incised into Cretaceous rocks. Nearly vertical orientation of bedding planes between the mouths of Silver and Ethel's Creeks was mapped by Ramp (1977). This creates very steep slopes along the river (see slope elevation map). Fault displacement of originally horizontal to low angle sedimentary rock layers greatly increases failure potential, evident in the many shallow debris failures and rock slides along the mainstem through this area.

Soils developed on this rock type tend to be poorly cohesive, droughty and gravely to cobbley in texture. On steep slopes soils are poorly developed and soil depth is shallow.

Jurassic Dothan Formation (Jdo): Rocks of the Dothan Formation cover large areas of both Curry and Josephine Counties. In the analysis area however, only small slices of Dothan marine greywacke sandstone and conglomerate are exposed. One fault bounded section of rock forms a resistant ridge near the mouth of Fall Creek that diverts Fall Creek to the north. A waterfall on the creek may mark the boundary between the metamorphic Dothan formation and less resistant Cretaceous sedimentary rock.

Ultramafic rocks (Jur): In the analysis area, serpentinites occur as fault remnants and zones of sheared materials that occur in zones of major faulting. They also occur in conjunction with gabbro and metagabbro as weathered peridotite of the Josephine ophiolite sheet. Landforms underlain by serpentine are often gentle and rolling. Where oversteepened by road cuts or stream cutting they can fail as debris slides and stream bank instability. Because the soils developed on ultramafic rocks are relatively unproductive and poorly vegetated, landslides often continue to fail and ravel, becoming chronic sources of sediment. In areas of deeper soil development, often created along fault traces, deeper-seated slump/earthflows can occur. The south fork of Fox Creek contains an approximately one-quarter square mile slump/earthflow that is well delineated on the west by a fault trace. There are numerous rock falls and shallow slides into the stream off the slide deposit.

Soils developed on ultramafic rock are generally less productive than other soils in the area. They have reduced levels of calcium and elevated levels of magnesium, nickel and chromium that are toxic to most native vegetation. Vegetation is often sparse and stunted. Where parent material is mixed, or fault or shear zones have accelerated weathering and concentrated groundwater, deeper, more productive soils can develop. Soils are prone to surface erosion as sheet wash and gully formation, or ravel on rocky, steep slopes. Long-term compaction can occur with use of heavy equipment.

Metagabbro (mg): Gneissic metagabbros mapped along the lower Illinois River are interpreted to be associated with metavolcanic rocks of older formations to the east of the analysis area (Ramp, 1977). Metagabbro outcrops occur in fault contact with both older and younger formations to the east of the Coquille River Fault, but most notably in proximity to ultramafic rocks. In the analysis area, metagabbro is mapped between Silver and Indigo Creeks, but smaller outcrops no doubt occur throughout the area. Landforms underlain by metagabbro are moderately steep to very steep.

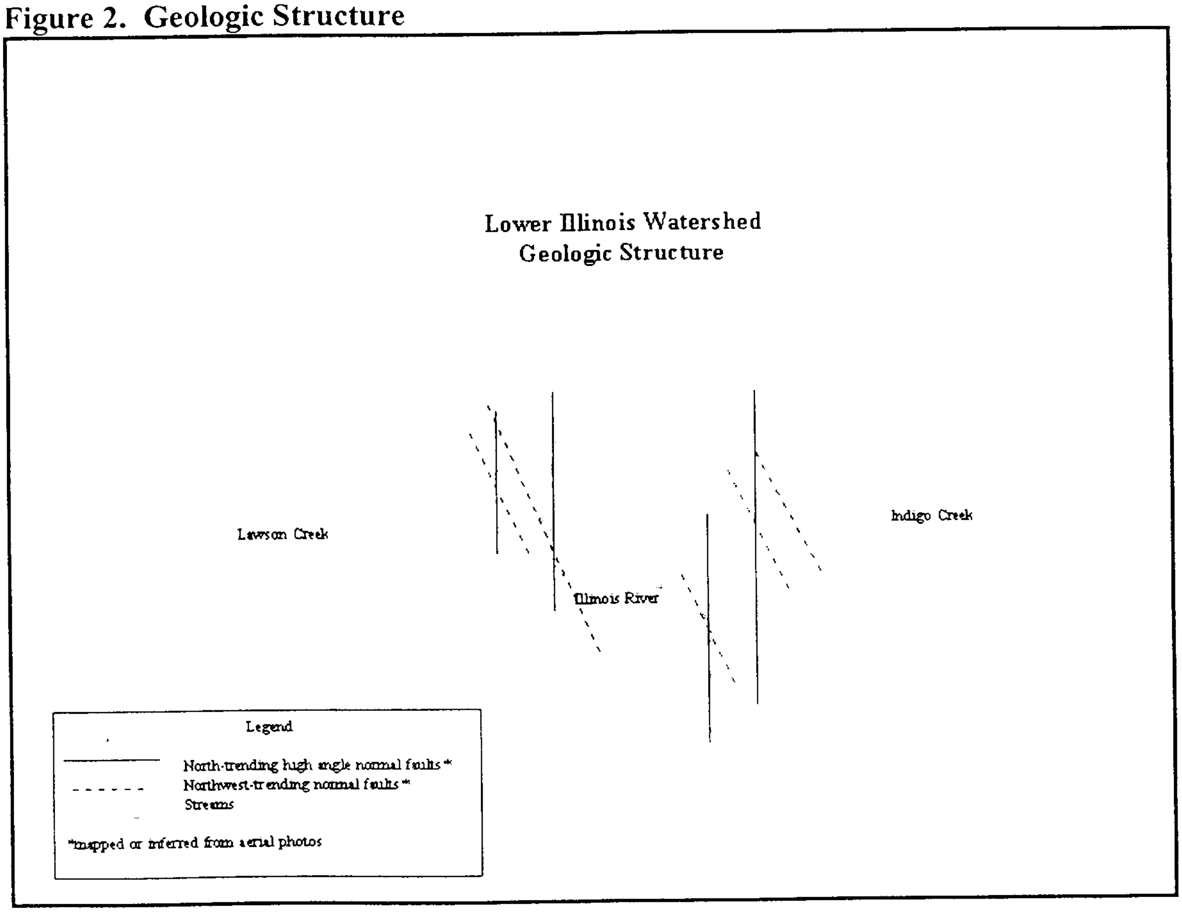
Soils derived from metagabbro are typically shallow, skeletal, and poorly cohesive. They are prone to shallow debris slides, rock falls, debris torrents and surface ravel.

Landforms and Geologic Structure

With the exception of Quaternary deposits, all of the rock formations in the analysis area have been subjected to tectonic faulting and folding. The lower Illinois River and its tributaries are remarkable for the structural control imposed on stream course and gradient by a strong pattern of regional faulting. The most obvious structural feature is the pattern of low-angle thrust faults (older rock types thrust over younger rocks) that delineate the different rock types in north-trending bands of formations that form an arc convex to the west. The oldest rocks are to the east, with successively younger rocks to the west. The age and tectonic history of these faults are complex, with relationships often obscured by landslides and serpentinite associated with these features. Subsequently, high angle, north-trending normal faults (younger rock types over older rocks) and shear zones have offset the pattern of thrust faults. This set of faults also parallels the trend of the major fold axes. The major high-angle fault in the analysis area is the Coquille River Fault.

A number of high-angle cross faults trending northwest to west are also mapped in the area. Most of them can be traced only for short distances, and appear to be younger than the north-south trending faults. It is notable, however, that when the fault traces of both sets of high-angle faults are plotted, they correspond to the pattern created by sharp stream bends, especially on the Illinois River, Indigo and Lawson Creeks

Figure 2. Geologic Structure



Gradient changes on the river and tributaries can also be directly related to rock type and structure. For example, Nancy Creek flows across the gentle slopes of Lookingglass mudstones at the headwaters, moderate slopes underlain by ultramafic rocks, and steeper slopes of Cretaceous sedimentary rocks before exiting on a level terrace of Quaternary sediments. A fault contact between Cretaceous and ultramafic rocks also forms an area of stream constriction and gradient change on the Illinois River between Indigo and Horse Sign Creeks.

Subwatershed Descriptions
(see Stream Profiles)
Lower Illinois: The course of the lower Illinois River is strongly controlled by the underlying geologic structures. Where the north trending normal faults cut more resistant rock types, the river is confined to straight, deeply entrenched bedrock channels. Offset by northwest trending faults forms sharp bends in the stream course, often marked by areas of debris slides and rock falls from the canyon walls. Constrictions from block glides (landslides of large, coherent blocks of material from the slope) and large slump/earthflows were also noted along the lower Illinois, including slides across from and to the west of the mouth of Indigo Creek, and the drainage north of Old House Creek. These large, ancient failures appear to be associated to faulted contacts between rock types. An area of approximately two square miles between the mouths of Silver and Indigo Creeks (Bluff and Black Creek drainages) has two large block glides that may be down-dropped fault blocks.

Ethel's Creek: Ethel's Creek drains a large, ancient landslide. The top of the slide roughly follows the contact between serpentine and sedimentary rock formations; shallow debris slides and ravel occur near the scarp of the slide.

Fall Creek: An ancient landslide (slump) was mapped to the north of the mouth of Fall Creek, and may mark the contact between Tertiary mudstone and Cretaceous marine sedimentary rocks. Old landslide forms with benchy deposits that toe out into headwater draws mark the northern drainage of Fall Creek. There is active stream back instability where the deposits are being undercut by streams. Numerous, more recent debris slides and debris flows were mapped in the upper watershed and appear to be related to road drainage and timber harvest.

The headwaters of Fall Creek flow over gentle slopes of Lookingglass mudstones, with steeper gradients that may be related to old landslide scarps, or faulted contacts between mudstone and other rock types where underlying bedrock has been fractured and sheared, and is more easily eroded. Fall Creek also passes through Cretaceous sandstone and conglomerates, and is turned north above the mouth to follow a resistant ridge of Jurassic metamorphosed sedimentary rocks before entering the stream terrace. Stream gradient reflects the course of Fall Creek through the changes in geologic lithologies and structure.

Fox Creek: Fox Creek also flows through different rock types, with steeper gradients corresponding to Cretaceous sedimentary rocks in the headwaters and flatter gradients where the stream flows over ultramafic rocks. Riparian areas and headwalls on the upper slopes have numerous debris slides and debris flows; the smaller failures appear to be related to past timber harvest. The number of slides and amount of stream bank instability increases downstream where roads and harvest have accelerated the landslide rate. In the analysis area, the majority of the recent failures (mapped from 1997 photos) were in the Fox Creek drainage.

The south fork of Fox Creek drains a large (one-quarter square mile), ancient slump/earthflow that also delineates the faulted contact between Cretaceous and ultramafic rock formations. The creek follows the northwest margin of the earthflow and the trace of the fault, and is marked by ubiquitous debris slides, ravel and rock falls. A plot of the stream gradient follows a typical profile for a slump/earthflow.

Nancy Creek: The headwaters of Nancy Creek flow over rolling hills underlain by Lookingglass mudstones. Swales in the upper plateau area become more deeply incised and unstable draws as the stream steepens through more resistant, metasedimentary bedrock down slope. Road drainage and harvest appear to accelerate the rate of landslides through this area. On the lower slope, the lower stream gradient reflects ultramafic bedrock, and the sharp break may mark the Coquille River Fault and more resistant Cretaceous sedimentary bedrock. A tributary to the north contains an old landside form, the toe of which is actively raveling into the stream.

HYDROLOGY

Climate

The climate of the Illinois River watershed varies because of its steep topography and interception of moisture from the Pacific Ocean. Lower temperatures and more precipitation occur on the west slopes of the mountains. The interior valley between these slopes is drier with high summer temperatures. Annual precipitation ranges from 70 inches near the mouths of Lawson Creek and Indigo Creek to 180 inches near the ridges bordering the north headwaters of Indigo Creek. About 80 percent of this precipitation occurs between October 15 and May 15. Snowfall is prevalent at elevations over 4,000 feet, and intermittent at elevations between 2,500 and 4,000 feet. Natural Resources Conservation Service (NRCS) data for the Bigelow Camp snow pillow on the eastern border of the Illinois Watershed at 5,100 feet elevation indicates that 30 to 50 percent of the precipitation at this site falls as snow (SNOTEL data).

George Taylor, the State of Oregon Climatologist, has compiled annual rainfall data for Oregon that has been collected since 1850. By comparing each year's annual precipitation to the average for the period of record, he has found a precipitation cycle of 20 to 30 years. These precipitation cycles are reflected in streamflow records and fish population records (Taylor, 1999).

1896-1916	wet
1916-1946	dry
1946-1976	wet
1976-1996	dry

Channel Morphology

River Flow

Stream flow patterns are typically moderate to heavy runoff throughout the winter and early spring with low flows during the summer and fall. Many of the small tributary streams become completely dry during the fall.

The following USGS gaging stations have monitored stream flow on the Illinois River and its tributaries (Moffatt, Wellman, and Gordon, 1993).

Table 4. USGS Gaging Stations

Number	Name	Period of Record	Peak Flow (cfs) / Date	Low Flow (cfs) / Date
14372500	East Fork Illinois near Takilma	1926-1987 (intermittently)	15,700 / Dec 1964	4.6 / Nov 1960
14375000	Sucker Cr near Holland	1941-1965	17,500 / Dec 1964	17 / Oct 1941
14375100	Sucker Cr below Little Grayback	1965-1987	19,300 / Dec 1964	12 / Oct 1974
14375500	West Fork Illinois near O'Brien	1954-1985	16,100 / Dec 1964	1.5 / Sep 1974
14377000	Illinois River near Kerby	1926-1961	56,800 / Dec 1955	9.6 / Aug 1959
14377100	Illinois River near Kerby	1961 to present	92,200 / Dec 1964	14 / Aug-Sept 1986
14377500	Deer Cr near Dryden	1941-1956	5,000 / Jan 1953	0.9 / Sep 1951 and 1955
14378000	Illinois River near Selma	1956-1968	160,000 / Dec 1964	61 / Aug-Sep 1959
14378200	Illinois River near Agness	1960-1981	225,000 / Dec 1964	125 / Sep 1977

Estimations of extreme high flows at these sites were based on slope-area measurements, runoff ratios with other gaging stations, and estimated effects of backwater from the Rogue River at the Agness site.

The gaging station on the Illinois River near Agness, Oregon was maintained from October 1960 to September 1981. The station was at river mile 3.0, just below Lawson Creek, and the measuring site was at river mile 0.9, just below Fox Creek. During the period of record the river had an average annual discharge into the Rogue River of 2,966,000 acre-feet per year, nearly half the discharge of the Rogue River prior to the construction of the Applegate and Lost Creek dams (Moffatt, Wellman, and Gordon, 1990).

The only gaging station on the Illinois River that is still being maintained is 47 miles upstream at Kerby, Oregon in the Illinois Valley (Hubbard, Herrett, Poole, Ruppert, and Courts, 1999). It has a period of record from March, 1926 to the present, with a change in the location of the gage in 1961. Estimated peak flows for extreme flood events at this site were 56,800 cubic feet per second (cfs) December 22, 1955 and 92,200 cfs December 22, 1964. The "New Year's Flood" of January 1, 1997 had an estimated flow of 37,400 cfs.

A comparison of discharge per square mile (csm) for the period when both the Agness gage and the Kerby gage were active shows that calculations of flow at the mouth based on extrapolations from the Kerby gage would have predicted peak flows ranging from 40 percent under to 65 percent over their actual recorded flows at the Agness site.

Human Influences

Water withdrawal permits for the entire Illinois River, including all of its tributary waters, total 1,124 cfs. However, 907 cfs of this is listed as industrial use, which may be primarily non-consumptive mining (suction dredging). If that is subtracted out, 217 cfs are permitted withdrawals for irrigation, domestic, and municipal use. The average flow at the old Agness gage site near the mouth was 230 to 280 cfs in August and September, with low flows of 130 to 150. It is unknown how much of the permitted flow is withdrawn at any one time. In the Illinois Valley on Sucker Creek, where permits total 67 cfs and summer flows upstream of the permits at the Grayback gaging station average 30 to 40 cfs during August and September, water rights are cut back during low flows to permits granted prior to 1900.

Land use and developments also have the potential to affect the timing and magnitude of flows. Land clearing for agricultural and residential use, timber harvest, road construction, and urban pavement may concentrate flows. It is difficult to determine how much effect these activities may have had on flows in the Illinois River.

Water Quality

The Oregon State Department of Environmental Quality (DEQ) listed the Illinois River from the mouth to the confluence of the East Fork and the West Fork, and these forks from their confluence to the California border, as water quality limited for the temperature parameter. A Water Quality Management Plan has been approved for the Sucker Creek Watershed, a tributary to the East Fork of the Illinois River.

Temperature monitoring has shown some cooling of the temperatures in the Illinois River as it flows through the canyon, but 7-day average maximums just above Silver Creek are still over 70 degrees in late summer.

Illinois River and Tributaries, below Silver Creek

What are the dominant hydrologic characteristics and processes in the watershed?

Natural Processes

From the State Precipitation Isohyetal map, average annual precipitation varies from 70 inches near the mouths of Lawson and Indigo Creeks to 140 inches near Fairview Mountain, on the southern border of the Lawson Creek watershed. This falls primarily during the winter months, and primarily as rain, with 62 percent of the watershed in the rain-dominated zone, 37 percent in the transient snow zone, and 1 percent in the snowpack zone. Winter storm intensities can range from 8 to 13 inches in 24 hours during a 25-year event to 9 to 17 inches in 24 hours during a 100-year event. Lower storm intensities lie along the Illinois River, with higher intensities along the ridge bordering the southeast edge of the Lawson Creek drainage.

The Lawson RAWS station is located in the South Fork Lawson drainage. It collects rainfall (no snow collector), air temperature, and wind speed and direction data, and characteristically records the highest precipitation of any RAWS station on the Siskiyou National Forest. During the storm event of November 18 and 19, 1996, it recorded 24 inches of rainfall during the 48-hour period. This would correspond to a 25-year event, according to the Oregon State 25 year 24-hour precipitation map.

Tributaries of the Illinois River experience more frequent flood flows than the river, as they respond to smaller scale, local winter rainfall and rain-on-snow events. An example of the interactions at the mouths of these streams was during the flood events of water year 1997. The November 1996 storm was a coastal rainfall event that caused streams with headwaters near the first orographic divide east of the ocean to rise rapidly from their characteristic low autumn flows to overflowing their banks within 24 hours. The Illinois River at Agness did not exceed its banks, and Lawson Creek was observed shooting flow out into the river as if from a high-pressure hose.

Human Influences

Within this analysis area there are 23 water withdrawal permits, a total of 1.06 cubic feet per second, for domestic, irrigation, and livestock use. How much water is actually withdrawn is unknown.

Table 5. Water Withdrawal Permits

Stream	CFS
Nancy Creek	0.06
Old House Creek	0.12
Fall Creek	0.72
Fox Creek	0.03
Unnamed creeks	0.08
Unnamed springs	0.04
Illinois River	0.01
Total	1.06

The other primary human influences on hydrologic proccsses are effects of roads and vegetation removal on peak flows. The following factors are indicators of areas where effects may have occurred (USFS, 1993). (See Watershed Analysis Areas Map, and Regeneration Harvest and Roads Map).

- More than 15 percent of a watershed analysis area (WAA) harvested in a 30-year period may have increased water yield and minor peak flows; more than 30 percent harvested is likely to have increased flow. Predominant hydrologic recovery is probable after 30 years.
- More than 20 percent of the transient snow zone harvested is likely to increase peak flows during rain on snow events. Hydrologic recovery is dependent on tree height in relation to surrounding forest, and is probable after 50 years.
- Road density less than 3.0 miles per square mile is considered low risk for channel network expansion sufficient to increase peak flows; 3.0 to 5.0 miles per square mile is considered moderate risk; over 5.0 miles per square mile is considered high risk for contribution to increased peak flows.

Table 6. Timber Harvest and Roads by Seventh Field Watershed (includes all land ownership)

Watershed	Name	Acres	Percent National Forest Ownership	Road Density Miles/SquareMile	Percent Harvested before 1970	Percent Harvested after 1970	Percent of Transient Snow Zone Harvested
07L (sixth field)	Lawson Creek	25,235	99	1.85	6	10	23
07M01F	Between Lawson and mouth	2472	59	**3.88**	18	6	0
07M02W	Fall Creek	979	60	**3.27**	0	15	0
07M03W	Fox Creek	2075	71	2.22	23	4	0
07M04W	Nancy Creek	734	80	1.48	7	21	0
07M05F	Near Buzzard's Roost	1652	100	0	0	0	0
07M10F	Between Silver and Indigo	3099	99	0	0	0	0
07MH (3 seventh fields)	Horse Sign Creek	4909	100	1.60	0	0	0
Total		41155	94	1.60	6	7	20

These data indicate that timber harvest in the lower five subwatersheds may have affected water yield. Road densities are moderate in 07M01F and 07M02W, and indicate that flows may have been altered. There are additional roads on privately owned land in 07M01F and 07M03W that have not been mapped in GIS and are not included in these road densities, that could contribute to flow alterations. Within watersheds with any amount of harvest, small streams may have been affected as larger percentages of their small drainage areas were cleared. More detail on the harvest and road history of the Lawson Creek Watershed, including effects of harvest in the transient snow zone; and the Horse Sign Creek Watershed is in their Watershed Analyses.

Information Needs: Stream channels need to be evaluated in the field to determine whether they have been affected by timber harvest and road construction. Priority watersheds are 07M01F, 07M02W, 07M03W, and 07M04W.

Management Opportunities: Improve the road drainage on roads that are necessary for present and future access. Decommission roads that present a risk of resource damage and are no longer needed.

What are the basic morphological characteristics of stream valleys and channels and the sediment transport and deposition processes in the watershed?

Illinois River

The Illinois River enters the analysis area at the mouth of Silver Creek. From there to the mouth of Nancy Creek, the river continues to flow through the canyon that begins some 40 miles upstream near Eight Dollar Mountain. Long confined reaches transport sediment through during high flows, with some deposition along the outside of curves in the channel. The lower extent of vegetation in the canyon is well defined on aerial photos, as extreme flow events have removed the soil that colonizing plants would need.

From the mouth of Nancy Creek downstream to the mouth of the Illinois River, the river valley widens. Within the channel, large depositional bars change size and shape with peak flow events, and the river meanders through these bars. Above the channel are alluvial terraces, including Oak Flat on the east bank. Most of these terraces were meadows prior to euroamerican settlement, and are now used for pasture or other agricultural and residential use (see discussion of prehistoric and historic uses under Social Aspects).

Tributaries

Tributaries to the Illinois River in this analysis area are primarily steep transport streams with gradients from 4 percent to over 50 percent. (See stream profiles in Appendix B.) Characteristically, the sediment delivered from the erosional processes described in the Geology section is transported through these streams to the Illinois River.

Tracing these stream channels through the aerial photos taken in 1940, 1956-57, 1964, 1969, 1973, 1986, 1996, and 1997, there appear to be few changes, other than in Lawson Creek and Fox Creek. The Lawson Creek WA documented the changes to channels in that watershed as a result of storm events in 1955 and 1964, plus the effects of road construction and timber harvest. A debris flow in the early 1990s in a steep, unnamed channel just south of Nancy Creek appears on the photos to be related to an old road.

Fall Creek has an unusual stream profile, dropping steeply from the headwaters onto a mile long flatter gradient of 2 to 5 percent, steepening to over 10 percent, flattening to 7 percent through the reach where water withdrawal intakes are, then dropping approximately 50 feet in a free-falling waterfall before continuing its stepped drop to the Illinois River.

The flatter gradient reach flows through hillslopes of ravelly mudstones, some forested, some harvested, and some remnant oak savannas overgrown with conifers. The channel has little structure in this area, and in some places flows subsurface in fine mudstone gravels. Timber harvest left a 50 to 100 foot buffer of uncut trees along the south bank of Fall Creek in two 500-foot long segments; and harvest on State land removed all trees from both banks for 400 feet. In both harvested and unharvested areas, banks are ravelly and there are few riparian associated plant species.

Once it leaves the mudstones and begins dropping through sandstone, the channel has bedrock glides and steep pools with substrate of all sizes from fine gravels to truck sized boulders. Woody material of all sizes and decomposition ages add to the structure. Steep banks, nearly vertical in places, provide shade in addition to the mature forest. Vegetation includes characteristic riparian species such as sorrel, five-finger fern, swordfern, bigleaf maple, and alder.

From the water intakes downstream to the falls there are alterations – a 4-inch high grouted rock dam, and various pipes and drums that do not have much effect on channel morphology.

Fox Creek has a characteristic concave stream profile, dropping steeply from the headwaters, gradually decreasing to 10 percent at 1.5 miles from the mouth, 4 percent at one mile, and 1 to 2 percent in the last half mile before entering the Illinois. Much of the loharvested in the late 1960s, with a dense network of roads and skid trails. On the 1973 aerial photos, following the storm of 1973 (estimated as a 25-year event), fresh landslides can be seen in the harvested area in the steep inner gorge of Fox Creek. By the 1996 photos, the channel has stabilized and revegetated with hardwoods. This area appears undisturbed on the 1997 photos following the storm of Novwer half of the watershed was ember 1996.

Old House Creek has a uniformly steep profile, with gradients undulating from 6 to 15 percent and greater. The terrace was settled and roads appear on the 1957 photos. Roads and timber harvest appear on the 1969 photos on the slopes above the terrace. Portions of the headwaters on National Forest land were harvested beginning in the early 1970s. No changes in channel condition can be seen on the historical photos following these developments.

Nancy Creek has a very low 2 to 4 percent gradient for its first mile from the headwaters, as it flows along a plateau. It then drops steeply for the remaining mile of its length, leaving the plateau at 40 percent and gradually flattening to 6 percent where it enters the Illinois River. A portion of the plateau was harvested prior to the 1940 photos; and another portion between 1969 and 1973. No effects to stream channels are apparent on the aerial photos.

Lawson Creek has a characteristic concave profile, 5 percent dropping to 1 percent, with a bulge in the middle where a large slump-earthflow enters the channel. There are two depositional reaches, one just above the earthflow in Section 16 (T36S, R11W, S16) and the other near the mouth. Even in these 1 percent gradient reaches gravel-sized material is transported out during high flow events, leaving cobble bars. Channel condition and morphology are discussed in greater detail in the Lawson Creek Watershed Analysis.

The storm of November 1996 had the precipitation intensity of a 25-year event at the Remote Automated Weather Station (RAWS) in the South Fork Lawson drainage. This was probably the largest storm in two decades, since the events of 1973, and it mobilized sediments that had been stored in channels for many years. It caused greater deposition in the Section 16 flat gradient reach, filling pools with cobble-sized material and changing the morphology from pool-riffle to plane bed. The channel in this reach is expected to revert to pool-riffle as the material is transported further downstream during subsequent high flow events.

Horse Sign Creek is moderately steep, 5 to 10 percent from mouth to headwaters. Its condition and morphology are discussed in greater detail in the Horse Sign Creek Watershed Analysis.

What beneficial uses dependent on aquatic resources occur in the watershed? Which water quality parameters are critical to these uses?

The Illinois River and its tributaries in this watershed analysis area provide habitat and migration routes for anadromous fish, some species of which are listed as Threatened or Endangered (see Fisheries section). They also provide water for domestic use and irrigation, as discussed above. The river provides recreational fishing and swimming in the area from the mouth of Lawson Creek to the confluence with the Rogue River; and white-water boating through the canyon, primarily in the spring when flows are moderately high.

Turbidity

Typically, coastal Siskiyou streams run clear during most of the year, with turbidity during winter storms that clears within a few days. Exceptions to this are streams with large slump-earthflow features and active landslides at their toes. Lawson Creek within this analysis area has large slump-earthflow features. Landslides on tributaries outside the analysis area, such as the North Fork Indigo, also contribute to episodic turbidity in the Illinois River.

Temperature

This section of the Illinois River was listed as water quality limited for temperature in the 1996 and 1998 Oregon Department of Environmental Quality listing. Lawson Creek was listed as water quality limited for temperature, exceeding the state standard for this area of 64 degrees. The Lawson Creek Watershed Analysis found that the temperatures in Lawson Creek are primarily the result of natural processes (Lawson WA, pp. 31-34). Recording thermometers have monitored temperatures in the analysis area since 1989.

Table 7. Seven Day Average Maximum Temperatures

Stream	Site	Years	Range of 7-Day Max
Illinois River	mouth	1992-1998	71.7 to 76.3
Lawson Creek	mouth	1989-1999	67.2 to 72.5
Lawson Creek	Reach 2	1994	69.9
Lawson Creek	Reach 3	1994	69.1
Lawson Creek	At Trail Crossing	1995	64.2
Lawson Creek	Section 16	1990-1999	61.5 to 65.0
Lawson Creek	South Fork	1994-1995	60.2 to 62.8
Lawson Creek	North Fork	1994-1995	57.1 to 57.9
Wildhorse Creek	Mouth in Sec 16	1990-1999	59.1 to 62.0
Horse Sign Creek	mouth	1991	60.6

The stream temperature near the mouth of Fall Creek was measured as 58 degrees with a hand-held thermometer in the late afternoon of August 26, 1993. The remaining streams in this analysis area are expected to have temperatures well under the 64 degree State standard, based on their small size, aspect, degree of topographic shading, and the vegetation cover visible on aerial photos. See Riparian section for existing riparian condition.

Information Needs: Riparian vegetation should be evaluated for actual versus potential effects on stream shade.

Management Opportunities: Treat riparian stands that have the potential to increase shade by thinning overstocked areas and/or planting trees in under-stocked areas.

What is the character of fish populations in the Lower Illinois River?

Salmon and trout in the lower Illinois River are members of the South Coast stocks. They share life histories and population trends with fish produced in the coastal streams from northern California and southern Oregon. In the Rogue River basin, South Coast stocks spawn in tributaries upstream to near Stair Creek at river mile (RM) 43 of the Rogue. Stocks of salmon and trout in the Middle and Upper Rogue basin have different characteristics than South Coast stocks.

Most fish production in the lower Illinois basin occurs in tributaries. Winter flows in the mainstem are too powerful to allow successful incubation of fish eggs in all but the very mildest of winters. High storm flows can mobilize the bottom of the stream and destroy eggs laid in the gravel. Lawson, Indigo and Silver Creeks produce most salmon and trout in the lower Illinois area.

Characteristics of lower Illinois River salmonids are that fish spawning here tend to enter the river at the end of the adult migration runs; the juveniles enter the ocean earlier than upriver fish; and, in the ocean, they migrate south and stay close to shore (Rivers, 1991 and Meehan and Bjornn, 1991).

Lower Illinois River fish have shared the historic decline in numbers witnessed throughout the Rogue River since the late 1800s. The most telling example of the decline is the output of the salmon canning industry centered in Gold Beach. Fish caught in the river from the mouth up to Lobster Creek were the basis of the industry and include all stocks that spawn in the Rogue River. In 1861, entrepreneurs in the fish canning industry labeled Rogue River runs as large, or larger, as any in Alaska. A canning industry thrived at Gold Beach into the 1930s. At the peak of fish canning, packs contained up to 82,500 adult chinook in 1917 and 50,500 adult coho in 1928. However, when the state legislature finally banned commercial fishing on the Rogue River in 1935, the action was virtually unopposed because fish were so scarce the canning industry could not support itself (Rivers, 1991). Besides over harvest, factors contributing to this initial steep decline of Rogue River fish included climatic changes, dams, mining, and water diversions in the upper basin (Rivers, 1991). From 1922 to 1935, 6 million pounds of salmon were canned (Jerry's Rogue Museum).

Four species of the genus *Oncorhynchus* (Pacific salmon and trout) use the Lower Illinois River. Coho (*O. kisutch*) and chinook (*O. tshawytscha*) are the traditional Pacific salmon. All individuals must migrate to the ocean and each adult is capable of making only one spawning run from the ocean, after which it must die. *O. mykiss* (the Latin name for both steelhead and rainbow trout) and *O. clarki*, cutthroat trout, have more varied life histories. Both resident and anadromous populations of each exist in the Lower Illinois River. Individuals of these species can make more than one return migration to freshwater and can spawn more than once in their lifetime. These life histories are typical of the species throughout their ranges, not just in this location.

Lower Illinois River fish contribute to the lower Rogue River fishery. These fish are the basis both of a world-class fishery and of the culture of the human communities along the Rogue River. Fishing supports a large portion of the economies of the communities of Agness and Gold Beach. Numerous lodges and guide businesses have developed to serve river anglers. Additionally, commercial ocean salmon fishers depend on the coho and Chinook produced in freshwater, including lower Illinois River fish.

Non-salmonid species of fish in the Lower Illinois River include the anadromous Pacific lamprey (*Lampetra tridentata*), whose populations are suspected to be in decline throughout their range, yet about which very little is known. There are potentially three species of sculpin (genus *Cottus*) in the Lower Illinois River: coast range (*C. aleuticus*), prickly (*C. asper*) and reticulate (*C. perplexus*). Redside shiners (*Richardsonius balteatus*), a non-native minnow, were first detected in the Rogue River basin in the 1950s and have since spread to all suitable habitat in the basin (Rivers, 1991). Three-spined sticklebacks (*Gasterosteus aculeatus*), brook lamprey, and squawfish also occur in Lower Illinois River.

Coho Salmon

Coho in the Lower Illinois River are part of the Southern Oregon/Northern California group, which was listed as Threatened in 1997 under the Federal Endangered Species Act. The distribution of these coho extends from the Elk River in Oregon south to the Mattole River in California. The estimated abundance of these coho ranged from 150,000 to 400,000 spawning fish. Today, the group is down to approximately 10,000 naturally produced adults. The Rogue River is one of the major remaining coho producers (NMFS, May 6, 1997). Within the Rogue River, coho predominantly spawn and rear in the upper Rogue and the upper Illinois Rivers. The Rogue population is mostly hatchery fish. Most wild coho production in the Rogue occurs in the upper Illinois River tributaries of Greyback and Sucker Creeks. Habitat features in these streams which promote coho are low gradient reaches with wide valley bottoms and snow pack in headwaters to provide cool water during summer. These habitat features are not found in the tributaries of the Lower Illinois River, Lower Rogue River or South Coast streams. Therefore, the only coho in the lower Illinois River are those migrating through the mainstem towards the spawning tributaries of the upper Illinois River basin.

The population of adult spawners in the Rogue River was calculated for the years 1990 through 1996 based on mark and recapture seining at Huntley Park, Rogue River mile (RM) 8. During that time, coho adults averaged 3,401 individuals, with a low of 174 in 1993 and a high of 5,386 in 1996 (Nickelson, 1998). The same report estimates that a total of 5,400 adult spawners are needed to fully seed the best habitat. Because of the lack of classic coho habitat features, lower Rogue coho spawners are believed to be strays from the upper Rogue River or upper Illinois River groups and not remnants of a discrete lower Rogue River population.

Adult coho enter the mainstem Illinois River in the late fall, when fall rains increase the river's flow. They travel upstream to spawning grounds, holding in the larger pools of the mainstem if the flow drops adequately to prohibit upstream migration. Juvenile fish will stay in their natal streams for over one year congregating in the medium-sized streams. They migrate out of the system in late spring of their second year of life. Most Rogue River coho spend two years in the ocean before returning to spawn (Rivers, 1991). Since juvenile coho spend a full year in mid-sized streams they depend on high quality habitat features throughout that year. Habitat features of the mid-sized streams that do not promote coho production are high summer water temperatures (in the upper 60 degrees Fahrenheit), little instream cover or slackwater areas to escape high flows in winter, and a general low-density of instream wood. (See Temperature Section.) These conditions are typical of mid-sized streams in the coast range of southern Oregon, where coho production is low. These conditions do not affect other salmonids to the degree that coho are affected. Chinook migrate out of tributary streams by mid-summer and do not overwinter there, avoiding high water temperatures and high flows. Steelhead and cutthroat rely on smaller tributaries, which are cooler than larger streams in summer and have lower flows in winter.

Fall Chinook

Lower Illinois River fall chinook are part of the Southern Oregon and Northern California Coastal Evolutionarily Significant Unit (ESU). The range of this ESU is from Cape Blanco, Oregon south to the Klamath River in California. This ESU was proposed for listing as Threatened under the Federal Endangered Species Act. In September 1999, it was determined to not warrant listing.

Fall chinook salmon in the upper Rogue River were identified by NMFS, March 9, 1998 as the only relatively healthy population in the entire ESU. This is a stream-type stock, meaning that juveniles typically enter the ocean during the second year of life, migrate further distances in the ocean, enter freshwater as spawners early in the fall and then migrate long distances to headwater streams (Healy, 1983). Lower Rogue River chinook (including those in Lower Illinois River) are ocean-type fish. They typically enter the ocean within the first year of life and stay relatively close to shore, then enter freshwater to spawn late in the fall and occupy habitat low in the system.

During the late 1980s, the combination of drought, stream habitat degradation, low ocean survival and high ocean exploitation rates in the Klamath Management Zone resulted in a severe decline in chinook populations in all of the Oregon coastal basins south of Elk River. River angling for chinook in several southcoast basins, including the lower Rogue River, was closed during this time. Populations began to improve in 1991 with a sharp curtailment in ocean harvest coupled with the end of drought conditions by 1993 (ODFW, 1997). Juvenile trapping data show a positive trend in smolt production in lower Rogue River tributaries since the early 1990s. Prior to September 30, the fishery in the lower mainstem Rogue River is targeting chinook, which spawn in the upper Rogue River.

Adult fall chinook enter the Illinois River in late summer and disperse throughout the watershed to spawn as streamflow allows. Spawning is usually completed by the end of December, after which all chinook die. Fry emerge from the gravel in the spring and start migrating downstream almost immediately. Downstream migration peaks between the end of May and the middle of July and then continues at a declining rate throughout the summer (ODFW, 1997). During mild winters some juveniles can stay in the river. After migrating out of freshwater, these chinook will spend two or three years in the ocean before returning to spawn.

Winter Steelhead

Winter steelhead in the Rogue River are part of the Klamath Mountains Province (KMP) ESU. This ESU was proposed as Threatened under the Endangered Species Act in 1996. However, in 1998 the ESU was determined to not warrant such a listing based on recovery efforts in the states of Oregon and California. The ESU extends from the Elk River in Oregon south to the Klamath River in California. The NMFS estimates the current abundance of this ESU to be 85,000 with an historic abundance of greater than 275,000 (NMFS, 1996). The ODFW estimates that the population of winter steelhead in the Rogue River between 1970 and 1987 averaged 44,000 adult spawners annually. The same estimate since 1990 is 55,000 adults, which indicates a positive trend in the population (RVCOG, 1997).

Winter steelhead are the dominant salmonid in the lower Illinois River and spawn and rear in most tributaries here. Steelhead have a more variable life history than coho or chinook. They can spend one to several years rearing in freshwater and can survive reproduction to return to the ocean. Their sleek body proportions allow them to ascend steeper gradients and use smaller streams for spawning and rearing. They also roam more within a basin to locate suitable spawning habitat. Winter steelhead enter the Illinois River to spawn in the late fall and spawning continues into April. Fry emerge from late spring to early July. Most steelhead will spend almost two full years rearing in tributaries before smolting and migrating to the ocean in the spring. After typically two years of ocean rearing they will return to spawn. A small percentage of the population will return to freshwater after only one year. These so-called "half-pounders" are sexually immature and will return to the ocean again before making a spawning run.

Migratory Cutthroat Trout

Cutthroat trout in the lower Illinois River exhibit a variety of life histories. Multiple age-classes of cutthroat are consistently present in coastal Oregon streams, and forces driving their complex life histories are poorly understood (ODFW, 1997). Anadromous cutthroat usually rear in freshwater for two, three or four years before migrating to the ocean. They commonly return to freshwater to overwinter without spawning. Females begin spawning at age four and can survive to spawn up to four or five times. Spawning occurs in late winter and early spring (Trotter, 1997). In freshwater, yearling cutthroat appear to be displaced from prime habitat by other salmonid yearlings, probably because they emerge later and are, therefore, smaller.

Resident Trout

Both rainbow and cutthroat trout occur in resident forms in this section of the Illinois River. They occupy the uppermost reaches of most tributaries and commingle with the anadromous forms throughout the basin.

What is the character of fish habitat in the watershed?

Fish habitat in the analysis area is shown on the Salmon and Trout Distribution map and can be grouped into three general categories: the mainstem Illinois River, the large tributaries and the small tributaries. Each has a distinct physical and biotic regime.

Mainstem Illinois River

The dominant habitat feature in the watershed is the mainstem Illinois River, which provides primarily migration habitat for fish. This is a large river, with a low stream gradient, a confined active channel and powerful winter streamflows. It flows through a narrow alluvial canyon. Active floodplain development is minimal and restricted to the confluences with the larger tributaries. Perched terraces also occur near the tributaries and are remnants of an older baseline.

The region receives a high amount of precipitation between October and June and very little the remainder of the year. This results in a flow regime of extremes to which fish respond. During peak flows in late autumn, winter, and spring the entire channel is submerged. Only the inactive terraces are above water. To escape the force of the flow, fish hold on the margins of the channel, in submerged tributary mouths and in eddies behind boulders. Spawning is restricted to the tributaries, where streamflows are lower and do not wash away fish eggs incubating in gravel streambeds.

By late summer the river is reduced to only a fraction of the total channel width in many places, revealing wide gravel and cobble bars. Water temperatures rocket into the 70s during late summer, and fish hold in cooler water found at the bottom of deep pools and at the tributary mouths. During low flow conditions, the river is separated from the influences of forest riparian vegetation by bare rocks. Seasonal emergent rushes, willows, and herbs line the channel margins. By mid-summer, mats of filamentous green algae have developed in shallow water and provide nutrients and structure for photosynthetic, invertebrate and amphibian organisms.

Large wood is absent from the mainstem channel. Powerful storm flow and a confined channel result in large wood being flushed downstream, out of the watershed. Structural habitat diversity is provided by boulders and bedrock outcrops. Deep pools and turbidity provide instream cover.

Large Tributaries

Three tributaries in the lower Illinois River are large enough to allow a diversity of salmonid spawning and rearing. They are Lawson, Indigo, and Silver Creeks. Individual Watershed Analyses have been conducted by the Siskiyou National Forest for each stream and include a detailed description of fish resources. They are each designated Key Watersheds based on fish production and offer many miles of high quality Chinook, steelhead, and cutthroat and resident trout habitat.

Smaller Tributaries

Other than Lawson, Indigo, and Silver Creeks, the remainder of the tributaries to the lower Illinois are short, steep, and provide minimal or no fish habitat. Those that support steelhead are Fox and Horse Sign Creek. Horse Sign Creek has an individual Watershed Analysis. Two small tributaries, Fall Creek and an unnamed creek near Nancy Creek may support resident trout, but this is unconfirmed.

Information Needs: The presence of resident trout in Fall Creek should be confirmed.

Management Opportunities: There is a need to prevent sediment delivery from roads throughout the basin, especially in those tributaries known to support fish. Many culverts are reaching the end of their life and threaten streams with mass delivery of sediment. Many roads that are no longer needed can be modified or decommissioned to reduce hydrologic effects.

Some riparian forest stands have been cut and reforested and are now overstocked and stunted. Those adjacent to streams need to be thinned to allow growth of large conifers. This would also increase the potential for shade and large wood in streams.

Fire suppression has increased the amount of forested land and decreased the amount of meadow or grasslands in the watershed. Streams that flow through meadows provide different aquatic and riparian habitat and nutrients than those that flow through forests. Restoring meadows to their former range in the watershed would recover the meadow aquatic and riparian processes that have been lost to fire suppression. This would restore aquatic and riparian diversity in the watershed.

Fire suppression has also resulted in increasingly dense forests with high fuel accumulations. This situation makes the watershed vulnerable to high intensity forest fires, which can cause catastrophic adverse changes in hydrology and sedimentation of fish bearing streams. Reduction of unnaturally high fuel levels can reduce the risk of adverse affects from future forest fires.

RIPARIAN ECOSYSTEM NARRATIVE

What are the riparian processes in the watershed?

Stream Types

The character of a riparian area is inseparable from the character of the water body it surrounds. In this section of the Illinois River, streams are the dominant type of water body. Streams can be grouped, based on the surface flow regime, into three broad categories: ephemeral, intermittent and perennial streams. Likewise, riparian processes and functions can be grouped along the same lines.

An intermittent channel is defined by the ROD (USDA and USDI, 1994) as "any nonpermanent flowing drainage feature having a definable channel and evidence of annual scour or deposition" (ROD, B-14). This definition includes both "ephemeral" channels and "intermittent" channels. Ephemeral channels carry only stormflow, while intermittent channels are supplied by groundwater during part of the year (Reid and Ziemer, 1994).

Most ephemeral channels contain water for only a few days of the year and may not support riparian vegetation, so they are unlikely to have much direct significance for riparian-dependent species. Their major role is their influence on downstream channels. They supply sediment, water, and organic materials. Depending on the contrast between the ephemeral channels and the surrounding upland areas, they may or may not be significant migration corridors or unique wildlife habitat. (Reid and Ziemer, 1994).

Intermittent channels are important as seasonal sources of water, sediment, allochthonous material, and large wood. Because intermittent channels can form a high proportion of the entire channel system in a watershed, they contribute significantly to downstream reaches (Reid and Ziemer, 1994). It is therefore important to maintain their function of allochthonous material sources. These small streams are easily influenced by forest management activities and manipulations of the canopy or streambank vegetation can influence the stream's energy supply (Chamberlain et al., 1991). Because they do not have surface flow during late summer, intermittent streams are not a source of warm water to the summer stream network.

Intermittent channels can be important to those amphibian species which do not need open water throughout the year. These streams may be particularly important as nursery areas for amphibians because these sites support fewer aquatic predators than perennial channels (Reid and Ziemer, 1994).

The more different a riparian area is from its surrounding upland - in structure, humidity, thermal regime or nutrient availability - the more important the riparian area is for riparian-dependant species. When riparian areas are distinct from surrounding uplands, they can function as travel corridors and provide microclimatic refuge for riparian-dependent species (Reid and Ziemer, 1994). The distinctive vegetation and higher moisture content of these sites can also modify fire behavior, so their distribution can affect the patchiness of large burns. Since the watershed does not experience long, cold winters, riparian areas here are not critical for providing thermal protection from winter extremes.

Intermittent channels and their riparian zones are highly variable in their ability to provide habitat that is different from the surrounding uplands. Some riparian areas around intermittent channels are identical to the surrounding upland and some have a vastly different character.

Perennial streams, because they have surface flow throughout the year, generally support a riparian area quite distinct from the surrounding upland. The continually wet habitat they provide allows the fuller development of riparian-dependent plant and animal communities. During late summer and early autumn, when the surrounding uplands are typically quite hot and dry in this section of the Illinois River, riparian areas along perennial streams become especially important for riparian-dependent species. Organisms, which were previously dispersed into the riparian areas along intermittent streams or into upland areas, congregate along perennial streams to find suitable conditions.

Nutrient Routing

There are two sources of the nutrients necessary to support riparian-dependent species: **autochthonous sources** (produced on site, usually from photosynthesis), and **allochthonous sources** (produced off-site and transported into the area). Aquatic and riparian ecosystems increase in complexity with the progression from headwater tributaries downstream to the mouths of the mainstem rivers. Allochthonous sources dominate in the upper reaches of the watershed and the availability of autochthonous sources increases further downstream.

Autochthonous sources of energy are affected by stream size, gradient, and exposure to sunlight. Allochthonous sources of energy contribute organic matter to the stream by four main pathways: litterfall from streamside vegetation; groundwater seepage; soil erosion; and fluvial transport from upstream. Organic matter from these sources differs in when and how it enters the stream, how it decays, and where it predominates (Murphy and Meehan, 1991).

Most animals require food with a Carbon to Nitrogen ratio (C:N) less than 17:1. Almost all forms of allochthonous organic matter have higher C:N ratios, so they require microbial processing to enhance food quality. The quality of various forms of organic matter varies widely, as measured by the C:N ratio. At the low nutritional end of the spectrum are woody debris and conifer needles (wood has a C:N ratio of 1,343:1); at the high end of nutritional quality are periphyton, macrophytes, and fast-decaying deciduous leaves (macrophytes 8:1 and alder leaves 23:1) (Murphy and Meehan, 1991).

What are the vegetative types of riparian areas in the watershed?

Riparian zones in this section of the Illinois River can be stratified into four distinct categories based on vegetative characteristics. These are conifer forest, hardwood forest, meadows, and riparian areas on soils developed in serpentinite and peridotite (ultramafic soils). Each category has its own processes for sediment delivery, channel formation, hydrologic regime, susceptibility and response to change, microclimate qualities, flora, fauna, and migration habitat qualities.

Conifer Forest Riparian

The most abundant riparian type in the Illinois River, below Silver Creek, watershed is the conifer forest riparian. It is generally located on soils with high to moderate productivity, where water supply is not limiting growth and topography tends to exclude frequent or intense fire. Abundant, tall conifers dominate these riparian areas. Douglas-fir is by far the most common overstory conifer, with Port-Orford-cedar often present. Pacific yew has very scattered distribution.

The stand canopy is closed in these areas and many stands have multi-layered canopies. Hardwood trees are often an important mid-layer component. Conifers, with the exception of cedars, create more acidic soils through litterfall than hardwoods. The evapotranspiration associated with the numerous large trees is high. Air temperatures are cool and diurnal fluctuations are moderated throughout the year. These riparian ecosystems maintain important microclimates.

The stands are generally very stable. Tanoak seldom reaches climax condition due to the time-span required for this succession and the longevity of dominant conifers (200 to 300 years). Fire does not start or carry well in most of these stands. Light disturbance from windthrow, land movement, wind or snow damage leads to continual recruitment of conifers. In the event of large-scale disturbances these riparian stands are slow to recover to a mature state. Where Port-Orford-cedar is present in the riparian zone, roads and streams are important conduits for *Phytophthora lateralis* (Port-Orford-cedar root disease).

Conifer stands often have a higher percentage of perennial streams than other vegetation types. Root strength and often-dense undergrowth contribute to generally stable stream banks. However, riparian conifer stands can develop on earthflows, and exhibit features of deep-seated instability. Earthflows can be important sources of structure for stream channels by providing boulders and large wood. Throughout conifer riparian areas, large wood in the form of limbs and boles is continuously delivered to and incorporated into the channels. Stream temperatures tend to be cool throughout the year. Tall trees can shade even moderately wide channels in summer.

Where coniferous riparian areas are surrounded by similar upland stands, they are important water sources for interior habitat-dependent wildlife. When they are dissimilar to the surrounding upland habitat, they are important uphill-downhill dispersal corridors for interior species. Stable air temperatures make them valuable thermal refugia in extreme weather for many wildlife species. These riparian stands can be important habitat for spotted owls.

Conifer riparian areas can have a moist microclimate and be important to organisms requiring cold, wet environments. For example, Pacific giant salamanders utilize headwater streams to lay their eggs (Stebbins, 1966), and talus habitat in these moist areas can be important for Del Norte salamanders. Meadow and hardwood riparian areas usually receive more solar energy and favor species adapted to more sunlight, lower humidity and warmer temperatures.

Riparian stands of red alder are generally an early to mid-seral stage of the riparian conifer forest. These stands were usually created by stand replacement events such as timber harvest, debris flows, inner gorge landslides, and floods. In some areas red alder is an important component of a mature conifer riparian ecosystem. These alder stands can be important habitat for white-footed voles, and alder leaves are a good source of nutrients for the aquatic ecosystem.

Because of its abundance and high value wood production, more land use activities have occurred in conifer riparian stands than in any of the other riparian types. Therefore, conifer riparian stands are most likely to be candidates for restoration.

Hardwood Forest Riparian

Hardwood-forested riparian stands tend to replace conifer-forested riparian stands where water is limiting or where a regime of either frequent low intensity or high intensity fires has disturbed the riparian zone. Hardwood riparian stands are usually dominated by tanoak trees, with madrone, myrtle, chinquapin, knobcone and sugar pines often present. Scattered conifers such as Douglas-fir will grow directly out of the stream channel, where there is more water, but they are anomalies in these stands.

Although the canopy is closed, the single-storied structure does not have the insulating qualities of the conifer forest. Humidity is much lower and air temperatures vary a great deal with the seasons. The microclimate differs little from surrounding upland. Fire will both start and carry well in the riparian stands. These stands have low resistance to change from fire and wind and snow damage, yet their closed canopy, single-storied structure is quick to regenerate. Ground cover is usually low, leading to more surface erosion than conifer riparian stands, but their characteristic stump sprouting after disturbance leads to consistent bank stability.

Hardwood riparian stands are generally similar to their upland surroundings, making them valuable watering sites for local wildlife. They are less important for thermal cover and migration corridors than coniferous riparian stands. Their acorn crop makes them important foraging areas for mast-dependent wildlife.

The economic value of the hardwoods is much lower than conifers, so far less timber harvest has occurred in these riparian areas. As a result, restoration opportunities in this riparian type are few.

Meadow and Oak Savanna Riparian

The majority of meadow riparian areas are open canopy areas. As a result, these types of riparian areas receive high amounts of solar radiation; have high diurnal temperature fluctuations, little microclimate differences, and a narrow range of influence beyond the active channel. Fire will start and carry very rapidly through meadow riparian areas. They are dependent upon frequent fire for maintaining their open canopy characteristics.

Light vegetative covering makes easily destabilized banks prone to downcutting and headwall erosion following disturbance. Water temperatures show a strong diurnal fluctuation, similar to air temperatures. On-site diversity in these areas is low, yet may include highly specialized or unique species. Downstream aquatic diversity is increased because of the different types of production occurring at these sites.

Riparian areas bordering meadows provide important water sites for meadow-dependent wildlife species. Their location along the edge of the forest/meadow ecotone increases the on-site diversity of terrestrial species. The meadow riparian areas provide connection corridors for meadow-dependent species.

Ultramafic Riparian

At these sites high levels of magnesium relative to calcium, high levels of nickel and chromium, and low levels of available soil water limit plant species to those tolerant of these conditions. These specialized communities contribute to the overall biological diversity of the watershed.

Most stands have an open to moderately closed canopy (20 to 70 percent). Understory vegetation cover varies from open to dense. The typically unstable slopes of ultramafic derived soils create high disturbance frequency, contributing to the sparseness of the canopy. Because of the more open canopy, seasonal and diurnal temperatures fluctuate more than in other riparian stands. However, ultramafic riparian stands provide a cooler, contrasting microclimate to the harsh upland ultramafic areas often dominated by open Jeffrey pine stands.

Port-Orford-cedar is often the primary overstory component in riparian areas. Port-Orford-cedar grows slowly on these sites, generally reaching 30 inches in diameter in 400 years on seasonal streams and 30 inches in 200 to 300 years in perennial wet sites. It will remain standing long after it dies. While Port-Orford-cedar has a slow decomposition rate, the sparse vegetative cover on ultramafics creates a low fuel load. This, in turn, results in low intensity fires when fire occurs.

Phytophthora lateralis is an introduced pathogen that kills Port-Orford-cedar, reducing shade and concentrating the delivery of large wood. Mortality rates in well-established disease sites are generally higher in the flat, wet sites and lower on steeper stream sections where spores cannot catch on to roots as easily. The rate at which Port-Orford-cedar dies from the introduced root disease could likely cause the population size to fall outside the range of natural variability.

Ultramafic rocks weather to produce landforms with unique topography and hydrology, often prone to mass wasting and erosion in areas with heavy precipitation. The highly sheared structure and low water permeability of the ultramafic rocks result in frequent springs and bogs, flashy flows, inner gorge landslides, and highly erodible stream channels which are sensitive to ground disturbance. The interaction of stream flow with large boulders and resistant outcrops can result in diverse channel morphology. Because ultramafic riparian areas have fewer trees than conifer or hardwood riparian, there is less large wood providing structure in the stream channel. However, when large Port-Orford-cedar is delivered to the channel, it decomposes slowly and functions as structure for a longer period of time than a similar piece of Douglas-fir. Because of the open canopy, stream temperatures are usually much warmer than in streams bordered by dense conifer or hardwood forest. The soil chemistry results in naturally higher pH water than in streams that flow through other soil types.

Although plant diversity is high, terrestrial vertebrate diversity and abundance is low. This is a result of the low thermal cover and low availability of forage. Most use by terrestrial vertebrates is seasonal. Riparian areas are important both as water sources and as travel corridors.

Restoration and enhancement attempts in sparsely vegetated ultramafic areas have had limited success. Development of disease-resistant Port-Orford-cedar and five-needle pine species could improve the success of revegetation in disturbed ultramafic riparian areas.

What is the existing condition of riparian reserves?

From PMR vegetation data (wildlife groupings) and managed stand data:

Table 8. Riparian Condition

Subwatershed	Percent Mature And Old Growth	Percent Harvested
07L Lawson Creek	41	14
07M01F	28	36
07M02W Fall Creek	74	9
O7M03W Fox Creek	40	62
07M04W Nancy Creek	40	37
07M05F	49	0
07M10F	40	0
07MH Horse Sign Creek	52	0
Total	43	14

None of the subwatersheds are at the 80 percent level usually considered to be the natural condition, even those that had no harvest. Most riparian harvest was more than 20 years ago, and some riparian areas are now well shaded by hardwoods and small conifers. Individual assessment of stream channels would be needed to determine the current shade condition.

Information Needs: There is a need to conduct site-specific analysis and surveys to support management activities within Riparian Reserves, as described in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (USDA and USDI, 1994). There is a need to determine whether previous riparian buffers were effective in protecting riparian processes.

Management Opportunities: There is an opportunity to implement management activities within Riparian Reserves which preserve the critical riparian processes, and meet the objectives of the Aquatic Conservation Strategy; and to restore riparian processes where they are not properly functioning.

Specifically:

Fire suppression policies have allowed conifers to encroach on Meadows and Oak Savannas, altering riparian function. There is an opportunity to restore these open areas, through treatment methods such as prescribed fire, girdling, and conifer harvest. Riparian ecosystem processes that have been described above should be maintained during restoration efforts.

Riparian thinning and/or planting in existing managed stands are possible management opportunities. Silvicultural practices should be used in these riparian areas to control stocking, reestablish and manage stands, and acquire desired vegetation characteristics needed to attain Aquatic Conservation Strategy objectives.

TERRESTRIAL ECOSYSTEM NARRATIVE

Vegetative Characterization

The lower Illinois River watershed contains a diverse assortment of plant communities. This watershed lies in the drier inland Siskiyou habitats. Within the watershed, especially on the eastside of the drainage, most soils are considered moderate to very deep and support timber stands dominated by Douglas-fir, and hardwoods such as tanoak, canyon-live oak, and madrone. Ultramafic soils on the western portion of the watershed between Horse Sign Creek and Silver Creek provide drier growing sites for conifer species such as Jeffrey Pine, western white pine, knobcone pine, incense cedar and Port-Orford-cedar in the wetter areas.

Riparian habitat is present at all but the highest slope positions. Wet meadows, seeps, and bogs are present in limited amounts in the upper reaches of some drainages, particularly in openings of forested areas. Meadows are apparent in the vicinity Silver Prairie and comprise less than 1 percent of the watershed analysis area. Douglas-fir is the primary component of the Late-Successional Reserve that occupies 3,767 acres or 34 percent of the watershed analysis area.

Exposure, soil moisture, elevation, parent material, and different climate regimes combine to produce the following terrestrial habitats for the various plant communities:

- rock outcrops, ridges, and screes
- wet meadows, seeps, and bogs
- riparian areas
- mixed conifer/broadleaf forest

Other habitats that are present include dry serpentine, mixed open woodland, and deciduous woodland habitat types. These habitat types make up less than 3 percent of the total area.

Dry meadows, grassy areas and brush fields are interspersed throughout the area in pockets ranging from 1 to 100 acres.

The mixed broadleaf/coniferous forest is the most common habitat type in the lower Illinois. It is well distributed at all elevations. The tanoak and Douglas-fir plant series are included in this habitat type.

Open mixed woodlands in the lower Illinois are transition zones between meadows/rock outcrops and dense forest, particularly in the lower parts of the drainage. Although the species present in the open mixed woodland are similar to those in mixed broadleaf/coniferous forest, the habitats differ in their degree of openness and the concentration of grass and forbs present in the herbaceous layer. Sensitive plant species present in this habitat type that are not present in mixed broadleaf/coniferous forest include *Umpqua frasera* and California globe-mallow. Groves of well-spaced white and black oaks over a grass and low shrub layer occur in the Oak Flat area. Fall Creek and the lower Illinois River face drainages contain remnants of open white oak, black oak, and pine stands that have been invaded by Douglas-fir with the absence of fire.

Most harvest activities within the watershed analysis area have occurred in the Fall Creek, Fox Creek, and Nancy Creek drainages. Approximately 10 percent of the National Forests lands in the analysis area are comprised of managed conifer plantations All plantations have been successfully restocked.

Portions of the Snow Camp Botanical Area and a portion of the Sour Game Botanical area are within the Lawson Creek Watershed.

On National Forest lands, Port-Orford-cedar grows in stands along with other tree species in the Fox Creek drainage, which drains directly into the Illinois River. Two very small epicenters of the disease are present in the Fox Creek area (See Port-Orford-cedar map). Limited information is available concerning Port-Orford-cedar and its associated root disease *Phytophthora lateralis* on privately owned lands within the analysis area. Port-Orford-cedar in Lawson Creek and Horse Sign Creek are discussed in their individual watershed analyses.

Wildlife Habitat Characterization

The Lower Illinois watershed (below Silver Creek) contains six percent of the larger Fish Hook/Galice Late-Successional Reserve (LSR). The vast majority of the watershed analysis area is east of the known range of the marbled murrelet. However, there is one known marbled murrelet occupied stand one mile from the extreme western boundary of the watershed. The late-successional habitat in the watershed provides important habitat for the American marten, pileated woodpecker and the threatened northern spotted owl, which are indicator species, meaning they represent other species that use similar habitat types. This version of the Lower Illinois watershed includes areas covered by Pacific Meridian Resources (PMR) data, which are primarily National Forest Lands with some private, BLM and other lands. Currently 39 percent of the 41,154-acre watershed is late-successional habitat.

Early successional habitat (grass/shrub/seedling-sapling-pole) in the watershed is found in recent clearcut areas, meadows, open woodland areas and brush field areas. Twenty-eight percent, 11,524 acres, of the watershed is currently in this condition. However, only a portion of this early successional habitat is in an open canopy condition, which will provide the pioneer habitat for species that require grass/forb, low shrub, open seedling-sapling-pole habitat for all or part of their life history. The majority of the existing clearcut areas that are currently open enough to provide this type of habitat will grow out of this condition within the next ten years. The meadow habitat is being encroached by trees. Pioneer successional habitat provides habitat for black-tailed deer, Roosevelt elk, and another estimated 180 species that utilize grass/forb, shrub and open sapling-pole plant communities.

Compared with other watersheds, a relatively large portion of the watershed is sparsely vegetated or covered with rock (492 acres or 1.2 percent). This watershed contains an estimated 87 acres or 0.2 percent water. The remaining 32 percent of the watershed is in young successional habitats, which typically are smaller diameter trees with closed canopy

What is the historic and existing late-successional habitat in the watershed?

Historic levels of late-successional forest (pre-1850 to 1950) have fluctuated over time due to climatic changes and human influence (Atzet and Martin, 1991). The Regional Ecosystem Assessment Report (REAP, USDA, 1993) estimated historic levels of late-successional habitat between 45 and 75 percent for the Lower Rogue Basin. The Lower Illinois (below Silver Creek) watershed is below this range.

Approximately 39 percent of the watershed is presently in late-successional forest (see Seral Stages Map). Historical vegetation mapping shows 53 percent of the watershed provided late-successional habitat in the 1940s, prior to any timber harvest (see 1940 Vegetation Map). Burning by Native Americans and early Euro American settlers probably reduced what could have been late-successional habitat in 1940 to lower levels. The exact percentage or level cannot be determined.

Late-successional forests are one facet of overall biological diversity. However, late-successional forests require special consideration because their integrity as functioning ecosystems and their ability to provide habitat to species associated with the forest interior may be strongly influenced by stand size (Rosenburg and Raphael, 1986). Logging in the Pacific Northwest has reduced the size of late-successional forests, resulting in region wide changes in wildlife species composition (Rosenberg and Raphael, 1986). On the Siskiyou National Forest much of the timber harvested has been on productive lower elevation sites. The amount of late-successional habitat on the Forest has been reduced nearly 26 percent since 1940 (USDA, 1989, Forest Plan FEIS, Chapter III-Affected Environment, page III-115).

Stands of late-successional forests are becoming isolated as harvest, fire and other activities disrupt connections between large, contiguous blocks of this habitat. This fragmentation threatens the ecological value of the remaining late-successional forests, including their value as habitat for forest interior plants and animals. The full impact of fragmentation of late-successional forests is not completely understood, but the populations and numbers of species associated with mature and late-successional forests can decrease if fragmentation, isolation, and reduction in stand size continue.

Interior forest habitat includes those portions of the late-successional forest areas that are not influenced by "edge effect." Edge effect is the result of changes in microclimate and species composition, which are caused by an increased exposure to sun and wind. Edge effect penetrates a forest edge for approximately two tree lengths or about 400 feet into the forest interior, which is a guideline for the Pacific Northwest (Harris, 1984; Franklin and Forman, 1987). The preliminary results of current research (Spies et al., 1990) generally support this approximate distance.

Interior late-successional habitat was analyzed using GIS seral stages based on PMR size/structure data and the 1940 timber typing data. Interior habitat was determined by buffering in from openings in the forest. Buffering distances used were 400 feet from clearcut or natural openings where tree size is < 20" or canopy closure is less than 40 percent. Because stands on ultramafic soils are largely open, and do not contain the same microclimates typical of closed canopy late-successional stands, these stands usually do not meet requirement of interior late-successional habitat. Current interior old-growth habitat is shown on the Interior Late-Seral Habitat Map.

Table 9. Distribution of Interior Late-Successional Forest Blocks within the watershed.

	Historic (1940)		Current Condition		Future (2040)	
Block Size in Acres	**Number of Blocks**	**Total Acres**	**Number of Blocks**	**Total Acres**	**Number of Blocks**	**Total Acres**
1-25	29	232	67	410	67	424
26-50	3	113	7	262	6	188
51-100	4	298	3	194	9	651
101-300	9	1,594	3	607	4	708
301-500	4	1,557	3	1,202	0	0
501-700	1	680	2	1,205	1	573
701-900	5	3,976	1	859	1	833
>900	5	8,024	1	1,170	3	7,514
Total Interior Acres*		**12,498**		**5,910**		**10,891**

* Historic interior old growth acres are based on broad scale timber typing from 1940 aerial photos. Current condition interior old growth acres are based on analysis of 30-meter pixel data from satellite imagery (PMR data). The difference in detail between the two sources accounts for most of the difference in interior old growth acres between these two dates. Increases in future interior old growth acres are based on projected growth of large stands of young conifers in the watershed. These stands originated during extensive stand replacement fires prior to the era of fire suppression that began in the early 1900s.

The National Forest Management Act (36 CFR 219.19) requires the maintenance of viable populations of vertebrate species well distributed throughout their current geographic range. Late-Successional Reserves have been designated to accomplish this direction for species that use this habitat type (USDA and USDI, 1994). Thirty-seven percent of the watershed has been designated Late-Successional Reserve and another 40 percent of the watershed will be managed towards a late-successional habitat condition through other land allocations.

The above tables show that there are currently lesser amounts of late-successional habitat in the Lower Illinois watershed than there was in 1940. Future projections indicate that the amount of late-successional habitat is expected to increase on federal lands, but remain low on private lands. This increase in late-successional habitat is consistent with the ROD (USDA and USDI, 1994) for federal lands (see 1940 Interior Late-Seral Habitat Map, 1995 Interior Late-Seral Habitat Map and 2040 Interior Late-Seral Habitat Map).

Information needs:

Management Opportunities: The ROD (USDA and USDI, 1994) indicates that thinning or other silvicultural treatments may occur inside these Late-Successional Reserves (LSR) if the treatments are beneficial to the creation and maintenance of late-successional forest conditions. Development of late-successional structure can be accelerated through treatment of managed and natural stands in LSR and other allocations not programmed for timber harvest. Fuel reduction projects can help protect late-successional habitat areas from being lost to stand replacement fires. Approximately 4,377 acres of managed stands in the watershed could be treated to improve habitat for the northern spotted owl and other species that use late-successional habitat. The opportunity exists to prioritize which of these stands would benefit late-successional species the most (i.e. stands within home range of owls or within potential habitat connections).

The highest priority for commercial stand treatment to improve late-successional habitat are those stands that have young or mature seral habitat adjacent to existing large late-successional habitat blocks (see Figure 13, Seral Stages Map). Treatment in these stands would result in the achievement of late-successional characteristics at an earlier time than if allowed to progress at a natural rate.

What are the special and unique habitats in the watershed and how are they changing?

The Siskiyou National Forest Plan designated 969 acres of Botanical areas (Management Area 4) within the Lower Illinois River watershed analysis area. This includes a portion of the Snow Camp Botanical Area (561 acres) and a portion of the Sour Game Botanical Area (460 acres). The Snow Camp Botanical Area includes interesting plants on both dry and moist sites. The first scientific collection (type specimen) of *Bensoniella oregana* was collected here. An interesting stand of Brewer Spruce is present near Huntley Springs. The Sour Game Botanical Area includes Sourdough Camp and Game Lake, which both contain very interesting botanical resources. A very large population of *Lilium vollmeri* is one of the finest populations of this species existing, according to Orrel Ballantyne, a botanist from the Arcata, California area who has studied our native *Lilium* species extensively. A disjunct population of Howell's fawn-lily (*Erythronium howellii*) was found at Game Lake in 1929, but has not been relocated. Appendix F of the Siskiyou LRMP EIS (USDA, 1989) provides descriptions of both Botanical Areas.

The Siskiyou National Forest Plan designated five areas (Lawson Butte, Gray Butte, Horse Sign Butte, Saddle Mountain and Emerald Canyon) totaling 444 acres as Unique Interest (Management Area 4) within the Lower Illinois River watershed analysis area.

During the past ten years a number of important but relatively small Special Wildlife Sites (Management Area 9) on the Forest have been identified as unique wildlife habitats and small botanical sites (Siskiyou LRMP, USDA 1989, page IV-113). A total of 2,839 acres have been designated in the Lower Illinois watershed (See Special Wildlife Site Areas Map). These sites constitute important components of overall wildlife habitat diversity and botanical values within the watershed.

Table 10. Special Habitat Sites (Management Area 9)

Type of Site	Number of Sites	Acres
Botanical	1	119
Dispersed Late-Successional	9	555
Elk Areas	1	39
Lakes and Ponds	10	52
Meadows and Meadow Buffers	22	1061
Rock Bluffs/Talus	15	244
Tanoak Areas	1	184
Wildlife Areas	2	585
Total		**2839**

Meadow, Open Pine Savanna and Open White/Black Oak Savanna Conditions

Historically Native Americans maintained meadows and open oak or pine savannas with burning. Early settlers may have reduced conifer encroachment rates on these open areas with heavy grazing and burning. Natural fires may have also opened many ridge top environments to meadow, or meadow-like conditions. Since the early 1900s, when fire suppression became effective in the watershed, the meadows and open oak savannas have increasingly become overgrown with conifer tree species.

Meadows and open oak or pine savannas are projected to continue to decrease in size due to vegetative encroachment and lack of high intensity fire events, unless encroachment is reduced through manual methods (girdling, and cutting trees) and through burning.

Other Special Wildlife Sites

Existing lakes, ponds, springs, talus areas, and rock outcrops with associated caves and cliffs are not expected to have changed very much from historic (1940) conditions. Rock quarry development has slightly reduced the amount of talus and rock outcrop habitat. No further analysis of these habitat components will be completed. Wildlife associated with these habitats include red-legged frog, southern torrent salamander and western toad (lakes, ponds, springs), Del Norte salamander (talus habitat), peregrine falcon, common raven, golden eagle, cliff swallow (cliff habitat), western fence lizard, sagebrush lizard, ringtail, porcupine, and marten (rock outcrops), and bats, bear, bobcat, cougar, and woodrat (cave habitat).

Information Needs: Inventories of the meadows, pine savanna and oak savanna areas need to be completed to determine species composition, amount of encroachment, the best methods to restore the meadow/savanna habitat, and the best methods to improve or restore native grasses and other species. Potential special and unique sites need to be surveyed to determine if they meet Management Area 9 (Special Wildlife Site) criteria.

Management Opportunities: There is an opportunity to return meadows, open oak and pine savannas to historic conditions. Returning to pre-effective fire suppression era would be a reasonable goal because the natural disturbance regime, which maintains these sites, has been halted through fire prevention. Some specific projects on federal lands include:

- Oak Flat Meadow - Reduce the amount Himalayan blackberries within the meadow by mowing and or burning.
- Fuel Hazard Reduction Project - Reduce the fuel loading near the town of Agness and restore meadows and oak savanna habitat in the lower ends of Fall Creek, Snout Creek and Shasta Costa Creek.
- Pine Grove Wildlife Area – This pine savanna area has large pine trees with a native grass ground cover that is being lost to encroaching conifer and hardwood trees. The encroaching trees may need to be removed, killed and left on site, or cut, piled and burned. Fire needs to be returned to this unique habitat area.
- Lawson Creek watershed meadows- See the Lawson Creek Watershed Analysis for a description of meadow and pine savanna habitat restoration opportunities.

What is the relative abundance and distribution of the species of concern in the watershed (e.g., threatened or endangered species, special status species, species emphasized in other plans)? What is the distribution and character of their habitats?

Proposed endangered, threatened and sensitive (PETS) species

The Siskiyou National Forest has three species listed as *endangered* or *threatened* under the Endangered Species Act: the (1) bald eagle, (2) northern spotted owl, and (3) marbled murrelet. Bald eagles, which are classified as threatened, have been observed in the watershed but are not known to nest in the watershed analysis area. Marbled murrelets, also classified as threatened, have been detected in one stand in the southwestern portion of this watershed analysis area. The Lower Illinois River watershed analysis area contains all or a portion of the median home range (1.3 mile radius around a nest or activity center) of 12 spotted owl pairs.

Peregrine falcons were removed from the list of Endangered and Threatened wildlife on August 25, 1999 (USDI, 1999). They were subsequently listed as a sensitive species by the Forest Service (USDA, 1999). There are no known nest sites in the watershed, however peregrine falcons have been observed in the watershed.

The late-successional habitat in this watershed contains the activity centers of eight owl pairs. The viability of owls within the watershed should remain stable. See indicator species section below.

This watershed will continue to contribute to the viability of bald eagles, marbled murrelets and peregrine falcons.

Sensitive Species

Plants: The watershed has numerous sensitive plants, and has numerous occurrences of several species. The following species of sensitive plants are known in the watershed: *Arctostaphylos hispidula* (Howell's manzanita), *Bensoniella oregana (Bensonia), Carex gigas (Siskiyou sedge), Cypripedium fasciculatum (*Clustered lady's slipper*), Erigeron cervinus (*Siskiyou Daisy*), Erythronium howellii (*Howell's fawn-lily*), Lupinus tracyi (*Tracy's lupine*), and Triteleia hendersonii* variety *leachiae (*Leach's Brodiaea*).*

Several occurrences of some of these species are particularly noteworthy. The northern end of the distribution of Siskiyou sedge (*Carex gigas*) occurs in the watershed at Saddle Mountain (Mullens, 1995). Clustered lady's slipper has its westernmost population in the watershed at Nancy Creek (Mullens, 1995). Two species formally occurred in the Game Lake and Sourdough Camp area, Howell's fawn-lily and Tracy's lupine during the early part of this century. Tracy's lupine possibly disappeared from this location due to fire suppression (Mullens, 1995).

Leach's Brodiaea has a very limited range with approximately 10 percent of the world's populations in this watershed analysis area. The Species Management Guide for *Triteleia hendersonii* var. *leachiae* (Titus, 1995) lists the 10 most significant populations. Two populations occur in this watershed, including a Fall Creek population in meadow and oak woodland habitat, and a Sevenmile Peak area population on fairly unusual substrates (apparently serpentine), near the southern edge of the taxon's range. The species management guide also lists fire suppression and related successional events, logging, and road construction as important threats to the species. It also lists meadow management as critical for the continued survival of this taxon. The guide also states that the depth of the bulb and the ephemeral nature of actively growing above ground structures most likely give the plant an immunity to all be the hottest fires. The management plan further recommends that monitoring plots on management activities be maintained.

One sensitive species of plant, the Oak Flat Sidalcea (*Sidalcea setosa* ssp. *querceta*) is now extinct. It was known only from Oak Flat, originally collected in 1953. When Dimling (1989) completed a recent taxonomic study, she determined that the *Sidalcea setosa* ssp. *querceta* is extinct.

Unique Tree Species

Ponderosa pine and Brewer Spruce are both found in the watershed but are uncommon. The Lawson and Shasta Costa watersheds provide an isolated western location for ponderosa pine in Oregon. Ponderosa pine and its habitat, most often an understory of oak and grass savanna, is at risk because of fire suppression and through encroachment by Douglas-fir.

The ponderosa pine plant series occurs mostly in four areas, two at the south end and two at the north end of the Lawson Creek watershed. The Pine Grove trail accesses one of the areas on the northwest edge of the watershed. Ponderosa pine habitat is less susceptible to encroachment on ultramafic (serpentine) soils. Verification on ponderosa pine versus Jeffrey pine should be done, especially on ultramafics. The Pine Grove Trail/Pebble Hill area likely contains both species, due to the influence of mudstones and ultramafics.

Brewer spruce (*Picea breweriana*) is found only in the Siskiyou Mountains of southwestern Oregon and northern California, and is the rarest North American Spruce. These spruce typically grow on dry to moist mountain ridges and peaks near timberline, and often under severe environmental conditions. It is a narrow endemic, presently occupying only a small portion of its former range.

The populations on Game Lake Peak and near Snow Camp Mountain are at the western edge of its present distribution. There is also a population within the Big Craggies Botanical Area, approximately five miles to the south. The population on Iron Mountain, within the Iron Mountain Botanical Area, is at the northern edge its present distribution, located approximately twenty miles to the north.

Brewer spruce is also known as "weeping spruce" because of its long and pendulous branches. It has the thin scaled-flaky bark typical of spruces and is thus quite fire-sensitive. Its slow growth may lead to a large gap in age groups, and possible decline, if regeneration is not occurring. Vigorous natural regeneration is apparently typical of the species throughout its range.

***Information Needs*:** Inventories of the meadows, oak savanna areas, and ponderosa pine plant series need to be completed to determine species composition, amount of encroachment, the best methods to restore these habitats, and the best methods to improve or restore native grasses and other species. Brewer spruce populations need to be assessed for hazardous fuels build-up. Verify that vigorous natural regeneration is occurring within the stands. Potential special and unique sites need to be surveyed to determine if they meet Management Area 9 (Special Wildlife Site) criteria.

Management Opportunities: For ponderosa pine plant series consider encroachment reduction through logging or fire and maintenance by periodic fire. Clear the understory to allow for regeneration if necessary. For Brewer spruce, medium to high-intensity fires should be avoided. Clear the understory to allow for regeneration if necessary.

Amphibians and Mammals: Amphibians and Mammals:

Del Norte salamanders, Northwestern pond turtles, California kingsnakes, and common kingsnakes are documented in the watershed. Common kingsnakes on the Gold Beach Ranger District have only been seen near the Rogue or Illinois Rivers above Agness in or near meadow habitat. Riparian areas in the watershed provide potential habitat for white-footed voles. Wolverine have not been sighted in the area and none have been detected on snow track surveys. Red-legged frogs have not been detected in the watershed area.

Neotropical Migratory Birds:

The few large, relatively unfragmented blocks of habitat remaining within the watershed provide good nesting sites for birds, such as the willow flycatcher, pacific-slope flycatcher and hermit warbler. These blocks are located in the eastside of Lawson Creek, eastside of Horse Sign Creek, north of Oak Flat and west of Silver Peak. Many neotropical birds are vulnerable to parasitism by brown-headed cowbirds. Cowbirds (edge specialists) are particularly attracted to human habitation and cattle, both of which are present in Agness and Oak Flat. These sites act as reservoirs for brown-headed cowbirds. Current numbers of cowbirds at these sites have been as high as 40 birds at Agness but numbers remain low at Oak Flat.

Western Kingbirds nest commonly in the Rogue and Willamette Valleys of Oregon, but usually don't nest along the coast. The only known nest of western kingbird in Curry County was found at Oak Flat during the summer of 1993.

Indicator Species

Seven forest wildlife species, and one group, have been selected as management indicator species. An indicator species represents all other wildlife that utilizes the same habitat type. Indicator species act as barometers for the health of various habitats (Siskiyou LRMP IV-10, USDA, 1989).

Bald Eagle and Osprey

Bald eagle and osprey utilize habitat corridors along major rivers, sometimes nesting up to one mile (occasionally further) from rivers in large green trees or dead trees. The Lower Illinois River watershed is important to the viability of bald eagles and osprey. Ospreys do nest near the Illinois River corridor. Bald Eagles have been observed in the watershed analysis area, but are not known to nest there. The Siskiyou LMRP (USDA, 1989) has Standards and Guidelines (4-4 and 4-9) for maintaining potential nesting habitat.

Spotted Owl, Pileated Woodpecker, and American (Pine) Marten

The northern spotted owl represents over 150 other wildlife species, which use late-successional forest habitat for all or part of their life cycles (Guenther and Kucera, 1978, Brown, 1985). Spotted owls are strongly associated with dense mature and old-growth Douglas-fir forests. These habitats provide the structural characteristics required by the owls for food, cover, nest sites, and protection from weather and predation. Pileated woodpeckers and pine marten represent the composite needs of over 160 wildlife species that utilize mature forest (Guenther and Kucera, 1978, Brown, 1985). The Siskiyou LRMP (USDA, 1989) had designated areas for the pileated woodpecker and pine marten within the Lower Illinois watershed (Management Area 8, Forest Plan, Chapter IV-Forest Management Direction, page IV-105). However, the ROD (USDA and USDI, 1994) amended MA-8, and created Late-Successional Reserves, which account for these species and the species they represent.

Existing sighting data from the Wildlife Observation (WILDOBS) database was analyzed. The geographical information system (GIS) was used to analyze stand level vegetation data to calculate historical, existing, and future levels of habitat for these species (Table 12). Mature and old-growth seral stages were used for spotted owl, pileated woodpecker and marten habitat.

Table 11. Habitat Trends for Selected Indicator Species

	Spotted Owl, Pileated Woodpecker & Pine Marten Habitat	
Year	Acres	Percent Watershed
1940	21,024	51
1995	16,320	40
2040	21,094	51

Spotted owls, pileated woodpeckers and marten have been documented in the Lower Illinois River watershed (see PETS section for more details). The future in this watershed looks bright for these indicator species and the species they represent as habitat continues to increase.

Woodpeckers: The composite snag needs of woodpeckers represent all wildlife species that use cavities for nesting or denning (Siskiyou LRMP FEIS, pages III-104, III-105, USDA, 1989). On the Forest, and most likely in the Lower Illinois River watershed, there are over 75 species which use snag habitat (Guenther and Kucera, 1978, Brown, 1985). Siskiyou Forest Standard and Guideline 4-13a states that habitat capability of woodpeckers should be continually maintained in areas managed for timber production at not less than 60 percent of potential population levels.

Woodpeckers are dependent upon snags and down wood for roosting, nesting, and foraging habitat. High intensity fires killed large conifers and hardwoods. The variation in amounts left after fires is not known. There were areas shown on 1940 aerial photos, where large brushfields did not contain visible large snags. These were mainly found in areas that likely had frequent fires, i.e. placed high up on ridges on south facing slopes. Smaller snags were created in stand development where competition between densely spaced trees and brush caused mortality.

Thirteen percent of the area in the watershed has been regeneration harvested leaving 87 percent in a near natural condition for snags. The exclusion of fire may have had an effect, but this effect is difficult to quantify. There does not appear to be any threat to this group of indicator species, therefore no additional analysis will be undertaken in this iteration of the watershed analysis.

Deer and Elk: Elk and deer use all successional stages to meet their habitat needs for cover, forage, and reproduction. Natural or created openings provide the majority of the feeding habitat, which is assumed to be the most restrictive habitat component in this region (Forest Plan FEIS, Chapter III-Affected Environment pages III-106 through III-107). Elk and deer represent more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Guenther and Kucera, 1978 and Brown, 1985).

Elk use seems to be concentrated in the Game Lake, Fairview Meadow, Wildhorse Meadow, Oak Flat and Fall creek areas. The elk mostly use recent clearcuts, meadows and open white/black oak savannas for forage. The higher elevation timbered areas in this watershed also provide good forage during the summer months.

Deer are found throughout the watershed, though an accurate estimate of their population is unavailable. Local residents report that populations are far smaller now than they were ten to twenty years ago. Deer use newly harvested areas and natural meadows for foraging. They also feed on acorns from oak trees throughout the area and use the riparian areas during fawning season and summer.

To estimate the amount of deer and elk habitat, the amount and quality of forage and cover was analyzed. GIS was used to analyze seral stages at the stand level. Tables 12 and 13 list the acres of each type of habitat estimated for the Lower Illinois River watershed.

Table 12. Historic Elk Habitat Type (1940)

Habitat Type	Percent of Watershed
Optimal/Thermal Cover	55
Hiding Cover	13
Forage	16

Table 13. Current Elk Habitat Type (1995)

Habitat Type	Percent of Watershed
Optimal/Thermal Cover	71
Hiding Cover	16
Forage	12

Existing conditions for elk habitat were evaluated using a model developed for use in Western Oregon. The model was based on the interactions of four variables: (1) size and spacing of forage and cover, (2) road density, (3) cover quality, and (4) forage quality (Wisdom et. al., 1986). Optimal cover modifies ambient climate, allows escape from human harassment, and provides forage. Thermal cover functions similarly to optimal cover, but it does not provide forage. Hiding cover allows elk to escape human disturbances (Wisdom et. al., 1986). The quality of forage is as important as the amount of forage available. Human disturbance allowed by motor vehicle access reduces elk use of habitat adjacent to roads (Wisdom et. al., 1986).

Currently the Lower Illinois River watershed does not meet LRMP 4-11, which requires that 20 percent of the watershed should be maintained in forage areas. As a requirement under NFMA, 219.19, the Siskiyou National Forest, Forest Plan FEIS, p. III-102, designated elk and deer as indicator species in the Siskiyou National Forest, Forest Plan FEIS. Deer and elk were selected because they are commonly hunted and they represent other species that utilize early successional forest. There are more than 180 wildlife species that need young successional stages to meet all or some of their requirements (Brown, 1985). NFMA, 219.19 states, "In order to insure that viable populations will be maintained, habitat must be provided to support, at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area." Because the percentage of forage acres is projected to decline, populations of wildlife species that are associated with this habitat type will decline on National Forest lands.

What are the locations and risk of spread for noxious weeds in the watershed?

Eight species of noxious weeds occur in the watershed. Five of these species are being aggressively controlled. They are: Gorse, Scotch broom, Yellow Star Thistle, Meadow Knapweed and Italian Thistle (see Noxious Weeds Map). The aggressive nature of noxious weeds threatens to destroy native plant communities. Many colonies have been discovered and destroyed, but many of these sites are still active because seeds left from mature plants germinate after the site has been treated. New colonies of these species are expected to continue to be found as seed is carried into the watershed from neighboring lands. The upriver portions of the Illinois River has numerous populations of yellow star thistle and meadow knapweed and will continue to act as a reservoir for weed seeds into the future.

The three remaining species, Tansy Ragwort, Canada Thistle, and Bull Thistle, have invaded the watershed to such an extent that individual site treatment is cost prohibitive. In addition, the seed from these three species is windblown and is carried long distances. Individual site treatment is not an effective means of control for these species. Biological controls, including a flea beetle and the cinnabar moth, have been introduced to reduce the number of tansy ragwort plants statewide. Biological controls for the two thistles are being developed by the Oregon Department of Agriculture.

Another species of weed, himalayaberry, although not designated as a "Noxious Weed" by the Oregon Department of Agriculture, does have potential to do great harm. This species is not native to Oregon and has taken over many acres of Riparian and Meadow habitat. Treatment at Oak Flat occurs annually.

Management Opportunities: It is especially important to control the brooms and gorse because they are just beginning to expand into the watershed and could potentially occupy much greater areas than they do now. It is also important to quickly treat any new colonies of new noxious weeds such as Yellow Star Thistle if they appear in the watershed in order to prevent them from becoming well established. The Italian Thistle population at Oak Flat is one of the highest priority weed infestations to eradicate because it is the only one known on the Gold Beach Ranger District.

Treatment of infected areas is needed to reduce, control, and/or eliminate the further spread of noxious weeds in the watershed. It will be necessary to survey disturbed areas to detect new populations of noxious weeds before they become well established. Treatment opportunities include cutting, pulling, or burning noxious weeds, introducing biological controls, closing roads, cleaning construction machinery before moving onto National Forest lands and before leaving infested sites, using only "clean" fill material, and using only certified weed-free hay. Seeding disturbed areas with native plant species will reduce opportunities for weeds to become established, and biological controls may be necessary to control widely distributed weed populations. Follow-up surveys of treated sites will be necessary to detect noxious weed population regeneration. Before ripping roads in contaminated areas it should be determined if doing so would encourage noxious weeds to take over disturbed sites.

What is the current and historic level of grazing in the watershed?

Grazing probably began in the watershed in the 1850s. Morris Fritsche ran a small herd of cattle (1890s to 1944) on Wildhorse Prairie prior to and after the Siskiyou National Forest was established. For many years he "held domain" over the surrounding country, claiming it as his own. After the Forest Service took over he greatly resented the enforcement of a fee for the grazing of his cattle and threatened to kill Dick Helm, an early Agness Ranger who tried to collect the grazing fee (Haefner, 1975). The 1937 Siskiyou National Forest Range Management Plan stated Fritsche had applied for a permit to graze two head of cattle on the prairie (Martinek, 1993).

Historically, grazing at Oak Flat and Agness was common but the number of livestock is unknown. Oak Flat has been continuously under a grazing permit since 1980 (Dillingham, 1995). Oak Flat has been grazed for 4 to 7 months by 23 to 29 cow/calf pair since 1980 (140 to 264 animal unit months annually). The Agness Guard Station at the confluence of the Rogue and Illinois Rivers has been grazed by the Lucas family since before the 1950s and has been under Forest Service permit since 1955 (Dillingham, 1994). Records in the past 10 years indicate grazing levels at Agness have been approximately 52 to 78 animal unit months annually. Grazing continues at both Oak Flat and Agness Guard Station Allotments today. Current grazing levels at Agness are 58 to 73 animal unit months annually, and at Oak Flat grazing levels are 105 to 140 animal unit months annually.

What are the locations and risk of spread of Phytophthora lateralis (Port-Orford-cedar root disease) in the watershed?

Port-Orford-cedar Information

Port-Orford-cedar occurs mostly in riparian areas and on wet serpentine sites in the Lower Illinois River watershed. It occurs on approximately 1,100 acres of the analysis area, all within Fox Creek. Approximately 1 percent of this acreage is infected with the root disease *Phytophthora lateralis*, in two small epicenters within the Fox Creek drainage (see Port-Orford-cedar map).

The natural range of Port-Orford-cedar *Chamaecyparis lawsoniana* is limited to northwestern California and southwestern Oregon but is found on many geologic zones and soil types, ranging from skeletal to productive soils. It is often the dominant tree in ultramafic riparian areas and frequently codominant with Douglas-fir in riparian areas of other geologic types. Crown closure by the species ranges from 0 to over 40 percent. Generally, however, throughout most of its range it is restricted to areas with consistent water seepage within a meter of the soil surface. Port-Orford-cedar is valuable both ecologically and economically.

Port-Orford-cedar provides shade, large wood, and vegetative diversity on riparian and upland sites. It is fairly tolerant of shade and competition in natural stands, and can occur as a pioneer, late seral or climax species within the same stand. Growth is usually slower than Douglas-fir except in ultramafic substrates. Frequently, in mixed species stands, other species will grow taller and out compete them within 25 years of establishment. However, Port-Orford-cedar retains the ability to respond after dominants die.

In old stands, Port-Orford-cedar seems as tolerant of fire as Douglas-fir. Older trees develop thick bark and survive large deep fire scars. The wood has a high resistance to decay and insects. It can be especially valuable as large wood in riparian areas, remaining in streams longer than equal-sized logs of associated species. It can also have lesser value for cavity-nesters due to its decay resistance. If utilized, cavity-nesters seem to prefer dead Port-Orford-cedar to green.

Port-Orford-cedar timber brings higher prices than almost any other conifer in the United States due to log export to Japan. It is the only species than can be exported from federal lands within the Pacific Northwest. Its domestic price as lumber, however, is low to moderate when compared to the price of cedar species such as western red cedar or incense. Port-Orford-cedar boughs are used commercially for floral arrangements and have been collected along the road system in the watershed.

Effects of Port-Orford-cedar root disease *Photophthora lateralis* on the watershed

Around 1952, an exotic root disease fungus or water mold, *Photophthora lateralis*, was introduced into the Pacific Northwest from an unknown source. Both Port-Orford-cedar and Pacific yew *Taxus brevifolia* are susceptible to this disease, but yew are not readily killed.

During adverse conditions such as dry weather, the fungus produces thick-walled spores (resting spores). These spores are the principal fungal forms in mud, and enable longevity of the fungus by providing a mechanism for surviving inhospitable conditions. Dry conditions reduce the danger of spread by spores but do not kill the fungus or its resting spores. Limited data indicates that infected soil can contain viable spores for approximately three years after the last host tree has died. Host tissue killed by this disease can also harbor thick-walled resting spores that can survive for up to approximately seven years while the Port-Orford-cedar host material decays. Under favorable conditions (saturated soils, cool soil temperatures, etc.) these resting spores produce the infectious zoospores.

A single introduction of the root disease into a waterway occupied by host trees can result in the spread of this disease to any adjacent, downstream, riparian area via water movement. However, the uphill distribution of this disease is slow because without an outside vector (carrier), this disease can only spread by root-to-root contact between infected and uninfected host trees. Discontinuity of host tree root systems is a barrier to its uphill spread.

Since 1952, this disease has been spreading throughout the range of Port-Orford-cedar primarily by the movement of infected plant materials or contaminated water or soil spread by gravity, equipment, vehicles, humans, or domestic and wild animals. The potential for loss of all Port-Orford-cedar stands to this root disease is low because of the existence of numerous protected populations representing both the environmental extremes and the middle of the species range. Currently, however, there is no identified genetic resistance or established chemical control for this disease. Prevention of spread seems to be the most effective control strategy.

Risk of disease spread

In general, areas at greatest risk for infection by *Phytophthora lateralis* root disease are Port-Orford-cedar or Pacific yew stands that have the greatest number of the following characteristics:

- associated with riparian areas and perennial water,
- •experience frequent or intensive land management activities,
- •experience frequent activities within or adjacent to riparian areas,
- •have high road densities and vehicle use,
- •are near native surface roads,
- •have high use by people or migrating animal species,
- •have high wet weather use,
- •are located downslope of or accessed through active, root disease, infection areas,
- •have high and continuous density of susceptible species,
- •are downstream of active, root disease, infection areas.

The primary vectors for spread of this root disease have been infected Port-Orford-cedar plant materials, human transmission (such as root disease spores being introduced via the mud on vehicles, equipment, tools or boots), or animal transmission (such as hooves of horses, cattle or migrating wild animals such as elk). The greater the potential for one of these vectors to move from an infected area to an uninfected area with these spores, the greater the risk of infecting an uninfected area. The spread of this root disease, therefore, is a function of the number of vectors, the risk that the vector has picked up spores, the proximity of the infected area to an uninfected area, and the likelihood that a vector will move from an infected area into an uninfected area.

Sanitation treatments (i.e. killing or cutting Port-Orford-cedar trees) and seasonal or year-around road closure can be effective in maintaining uninfected Port-Orford-cedar populations or limiting the spread of this disease. Year-around road closures within infected or uninfected areas and sanitation of stands containing Port-Orford-cedar adjacent to roadsides have been implemented within this watershed. Dry season operations, aggregate surfacing of some roads, use of uninfected water and earth, and pre-operation washing of vehicles and equipment have also been implemented. These latter measures can be effective in preventing the spread of the root disease, and are the preferred project-level control measures.

Management Opportunities: The following prevention techniques can be used to minimize the spread of *Phytophthora lateralis*: cutting Port-Orford-cedar from the edges of the roads; seasonal or year-round closure of roads to motorized vehicles; cleaning equipment before any operations; restrict high risk uses to dry season only; use uninfected water in firefighting and other activities; place a berm of rock on infested road sites where appropriate; plant disease-resistant trees in low-risk riparian sites and upland sites; continue public education regarding the importance of road closures; and enforce closures.

What is the historic perspective of fire in the Lower Illinois watershed, and how can fire be beneficially employed in the future?

Fire has been an integral part of the Klamath Province landscape as it has evolved, leaving evidence in fire scars and vegetation patterns. Fires with both natural and human causes have influenced the area for thousands of years.

The topography, vegetation, and weather of the area are typical of the inland canyon areas of southwestern Oregon. Slopes range from moderate (40 percent) to very steep (over 80 percent), with flatter ground on terraces near the mouth of the Illinois River. Mixed conifer stands, with a heavy hardwood shrub and tree component, dominate the landscape. Naturally occurring fuel loads are moderate, and fire has relatively low rates of spread under average fire season conditions. It can burn intensely under drier late season conditions or in drought years.

The summer climate of the watershed is strongly influenced by the warm, dry airmass which prevails over the inland areas. Cooler and moister marine air, which generally invades watersheds closer to the coast, rarely penetrates into the lower Illinois River canyon and its major tributaries. Winds are higher on ridge tops and canyon bottoms than in midslope areas. The entire watershed is subject to the diurnal wind patterns created by heating and cooling, with winds generally blowing down slope (down canyon) during the early hours of the day, and up slope during the afternoon and evening hours. During the late summer and into the fall, atmospheric conditions bring hot and dry east winds to the entire area. These winds generally overpower the local wind patterns, have high velocities, and maintain high temperatures and low humidities for 24 hours a day. Enough rainfall to extinguish fires or prevent them from growing before suppression action is taken often accompanies lightning storms in the watershed. Since record keeping began 80 to 90 years ago, human caused fires have accounted for about half the fire starts and most of the acreage burned (see Table 14).

Range of Conditions and Trends: From prehistoric times through the early part of this century, fires were allowed to burn unchecked. Weather and natural terrain features were the only influences on the spread of wildfire. Up until the 1930s and 1940s most fires were simply monitored, as effective fire suppression resources and tactics did not exist. From that time forward, fire detection and suppression have become more effective, and policies have mandated that all fires would be controlled. Because of the low frequency of fire occurrence and the success of fire suppression, the majority of natural stands remaining throughout the watershed have lacked the opportunity for fire to play its natural role over the past half century.

Although there is little historical evidence of naturally caused wildfire in the watershed, many stands reveal evidence of what can only be interpreted as prehistoric fire. Charring and fire scars on old-growth conifers can be found almost anywhere in the watershed. It is known that Native Americans used fire during prehistoric times for many reasons including enhancing forage and habitat for the game they hunted, stimulating growth of plant species used for food and basket making, clearing travel paths, protecting valued habitats from unwanted fire, and for both defensive and offensive warfare against rival tribes and European settlers. It is likely that valley bottoms, open meadow areas, and oak stands of the watershed were maintained in this manner.

Early settlers also used fire, but in ways that created more uniformity in the landscape, rather than the diversity sought by the native inhabitants. Settlers used fire to create and maintain grazing land for their livestock, as well as to clear vegetation for mineral exploration. They were often irresponsible in their use of fire, causing fires to burn far outside of the desired areas; and in some cases, setting fires for merely incendiary reasons. Habitable areas along the main river and ridgetop locations near Game Lake were subject to the indiscriminate use of fire up to the mid 1930s.

Historic Fire Activity

Historic fire information is drawn from copies of the Regional Fire Atlas and Record from 1910 to 1959, and from individual fire reports from the 1960s to 1991. The records cover a total time span of 81 years, 64 years of which can be accounted for. There are 6 data gaps, totaling 17 years, for which no records can be located at this time. A total of 4,545 burned acres are recorded, or 11 percent of the watershed.

These fire records indicate a low frequency of natural fires. Of the 19 lightning fires recorded, only two grew to more than five acres in size. These two, totaling approximately 525 acres, accounted for approximately 85 percent of the acres burned by natural causes. Both of them burned into the watershed from the Silver Peak area. The Silver Fire of 1987 was one of these, burning approximately 385 acres in this watershed.

During this same period 41 human-caused fires, eight of which grew to more than five acres in size, burned a total of nearly 4,000 acres. Approximately 16 of the small fires originated in the Oak Flat area, likely as a result of concentrated human occupation and activities. Based on a study completed for the Rogue River, Marial to Agness Watershed Analysis, it can be presumed that the majority of large fires occurred prior to 1940, when more efficient fire suppression methods were not in place in southwestern Oregon.

Table 14. Recorded fire history

Origin	Number of starts	Acres burned
Natural (lightning)	19	618
Human	41	3,927
Total	60	4,545

Stand composition characteristics, particularly homogenous stands of either younger conifers or mixed hardwoods, indicate that a stand-resetting disturbance such as fire has occurred in some areas. Panoramic pictures taken from lookout sites in 1934 and aerial photography from 1940 show this evidence of fire in a mosaic across the watershed, indicating that our records show only a small portion of the historic fire occurrence.

Typical of fires west of the Cascade crest, the effects of burning appear to be more severe on the south and east aspects and at higher elevations, than on north and west aspects and lower elevations. The aerial and panoramic photographs show that several fires appear to have been high severity, stand resetting disturbances, particularly on the southern aspects and along the ridge tops. This photography often shows little or no sign that a fire has passed through the northern and/or western aspects of an area, supporting the conclusion that a lower intensity fire normally burns on these sites. On a broader scale, there is a noticeable increase in fire severity in the eastern portion of the watershed, when compared to the western portion.

Present Day Fire Management: This watershed is allocated almost entirely to management areas where preplanned suppression strategies and acre objectives are set to control fires at a minimum size (Siskiyou LRMP, USDA, 1989). For Late-Successional Reserves the ROD (USDA and USDI, 1994) has set standards and guidelines which emphasize the prevention of habitat loss from large scale, stand resetting fires. Under the ROD and the South West Oregon LSR Assessment, fire may be used for its beneficial effects to the ecosystem, including hazard reduction to prevent or reduce the potentially undesirable effects of unwanted wildfire in the LSR, once a specific Fire Management Plan has been written for the area. Until then, rapid wildfire suppression will remain the objective for the watershed.

The adjacent Kalmiopsis Wilderness area currently has an approved plan which could allow fires of natural origin to burn under certain prescribed conditions. One condition that would preclude allowing natural fire to burn is the probability of such a fire escaping the wilderness, and entering an area such as the LSR where broad scale, high intensity fire is not desired. The use of prescribed fire is encouraged, using both planned and unplanned ignitions, to reduce the risks and consequences of high intensity fire within the Wilderness, or escaping from the Wilderness.

For the past decade funding for firefighting resources has been declining, leaving only limited resources available in the local area to respond for initial fire attack. Aerially delivered firefighting resources (rappelers) can respond to the area in approximately 35 minutes, from their base in Merlin, when available. A cooperating agency, Coos Forest Protective Association, off-Zone agency personnel, contractors, and air tankers can be called upon if a fire situation exceeds the control capabilities of these initial attack resources.

Privately owned land within and adjacent to the watershed is protected by Coos Forest Protective Association. Under a reciprocal mutual aid agreement, Forest Service firefighting resources share in protecting these lands, utilizing the closest forces concept.

The location of the communities of Agness and Illahe and private residential areas surrounded by National Forest lands creates mutual fire risk. A wildfire originating on National Forest lands could be a threat to the privately owned lands under severe burning conditions, and similarly, a fire originating on the privately owned land could pose a threat to the surrounding National Forest lands.

Interpretation

Until recent history, fires have burned without human efforts at control. "...our temporal window is small. Disturbance regimes of the last 300 years hardly give the range our ecosystems have experienced" (Atzet and Martin, 1991). Since natural fire events are random and chaotic in nature, we do not know what the fire cycles are, or what the pre-historic "status-quo" was. Atzet and Martin indicate we do not have a clear picture of the natural range of conditions, as it pertains to the role of fire in the Klamath Province. Prior to 1850, information about climate, fire regime, and Native American activities is scarce. Conditions since 1850 poorly represent natural conditions due to the influence of early settlement. The study of historic fire records supports this uncertainty in establishing the range of natural conditions. Records indicate that multiple, low intensity underburns were more prevalent than individual high severity stand re-setting fire events throughout the Klamath Province. Studies have found evidence of fire in approximately 63 percent of the stands examined and in these stands fire was the last and most important disturbance to occur. REFERENCE???

Fire cycles west of the Cascade Mountains are estimated to be considerably longer than those found east of the Cascades, particularly in Northeastern Oregon. This effect is even more pronounced along the westside of the Coast Range. While the coastal forest region is generally thought to have a wet climate, with few fires occurring at long return intervals, a more Mediterranean type of climate dominates the forests in the coastal Klamath Province where fire has played a very active role.

Conditions in Northeastern Oregon (the forest health situation and the effects that fire exclusion has had on it) may predict a similar path of events in Southwestern Oregon. It is only in the past 60 to 75 years that man has attempted to alter this course through suppression policies and active intervention. Atzet and Martin suggest that this intervention has increased the mean interval between fires, in the Douglas-fir series. Continued suppression may cause an "unnatural" build up of fuels, resulting in a greater proportion of high-intensity fires when an area finally burns. This concept is being recognized throughout the western United States, as it relates to issues of forest health and the increasingly catastrophic effects of wildfire on the landscape.

In Douglas-fir stands in the watershed, there is evidence of imminent mortality due to over crowding. Under growth has begun to occupy the majority of the ground, and dead fuels are building to the point where fire severities could prove lethal to entire stands. In unique habitats such as meadows, conifers are encroaching. In savannas, white oak and black oak are being over-topped and crowded out by these same conifers. All of these are indicators that the disturbance process of low intensity fire has been absent from these sites for a long period of time.

Fire starts will continue to occur. If wildfires burn under moderate weather conditions, and in areas where fuel conditions are such that the fire burns with a lower intensity, fires are likely to remain small and the forest in general could benefit from such an event, enhancing the values associated with LSR. However, where fuels have accumulated to higher than natural levels, fires burning under hot, dry conditions can evolve into stand replacement disturbances, producing undesirable effects on a broad scale. As time passes, the potential severity of wildfire will increase, unless there is proactive management of fire for the benefit of the resources.

Management Opportunities: The Southwestern Oregon LSR Assessment does allow fires to burn in the Late Successional Reserve (LSR) areas, under site-specific objectives. A Regional Ecosystem Office (REO) review of this assessment confirms this. The LSR assessment recognizes that fire can be used for the enhancement of fire dependent species and habitats and prevention of stand replacement fire events. These objectives can be met using either natural-caused or management-ignited prescribed fire.

In the Lower Illinois watershed, prescribed fire can also be used to reduce the fire hazard of selected areas, where its use can be implemented in a safe and effective manner. This would give the limited fire suppression resources of the area more manageable conditions for preventing wildfire from generating effects beyond those considered beneficial to the resource; as well as aid in protecting the interests of those living in the area surrounded by National Forest lands.

SOCIAL ASPECTS

The following characterization and key questions were developed to describe the past, present and potential future human uses of the Lower Illinois River Watershed, below Silver Creek.

Cultural Characterization

The Lower Illinois River Watershed, below Silver Creek, can be characterized as a dynamic landscape. For millions of years, the Illinois River evolved without the influence of humans. Over the last several thousand years, Native Americans and early settlers discovered and utilized the river and the surrounding terrain functioning as integral parts in the evolution of the watershed as it appears today.

The river, the land, and the resources available have set limits and provided opportunities for prehistoric and historic inhabitants alike. Interactions between natural and human forces have shaped the human use of the area. Flat, open land, preferred for human use, is limited within the watershed. Aggregations of people are limited by topography.

Prehistorically, the stream and river corridors were used as resource procurement areas dealing with shellfish and anadromous fishes. Upland areas were also seasonally used as procurement areas and as travel routes. In historic times, the lure of mineral wealth or land to settle attracted people to this difficult terrain.

The history of human use within the lower Illinois River watershed below Silver Creek can be reconstructed and interpreted by examining the physical remains and historic records of previous inhabitants as well as observable changes which are the results of human activities. Remains, examined in conjunction with information provided by the natural environment and historical records, can reveal patterns of human behavior and adaptation. The lower Illinois River watershed below Silver Creek contains both prehistoric and historic sites which represent every cultural milestone in the local history. Archaic to historic contact period prehistoric sites, early settlements, Indian war, mining, Depression Era sites and early Forest Service sites can all be found within the watershed.

The prehistory and history of the watershed are treated in Stephen Beckham's *Cultural Resource Overview of the Siskiyou National Forest* (Beckham, 1978). Additionally, Dodge, Peterson, and Powers have compiled general histories of the region. Fragmentary local histories exist in the form of oral histories, family journals, manuscripts and photo collections.

What were the prehistoric uses of the watershed?

Paleo-Indian to Northwest Coast Culture

The archeological record attests to a continuous human occupation of Southwest Oregon for at least the last eight to nine thousand years. Study of the Marial site (35CU84, Griffin, 1983) on the Rogue River provides several carbon-14 dates beginning at 8560 before present (B.P.), clearly establishing the antiquity of human life in this portion of southwest Oregon. Excavations carried out within the watershed, near the mouth of the Illinois River at the Tlegetlinten site (35CU59, Tisdale, 1986) unearthed materials from a later ancient culture, possibly dating from two major periods of use at 6,000 and 2,000 years ago. Human adaptations in southwest Oregon appear to have changed from a moderately mobile, hunting-gathering lifestyle to more sedentary, specialized economies. These changes are likely to have been influenced by the effects of population displacement and growth as a result of changing climates and environments in southwestern Oregon as well as in other areas.

Parallels exist between ancient Oregon cultures and the life ways of far-flung places. These similarities are based on the demands of human existence in habitats of a similar nature and illustrate the importance of adaptation to the environment as a factor in shaping human culture.

The Northwest Coast Culture

Native cultures of the Oregon coast belonged to the greater Northwest Coast culture area, which extends from Alaska, on the north, to Cape Mendocino, California, on the south. Although populated by a wide variety of different groups speaking a variety of languages, all of these groups shared a broadly similar way of life. Differences between them were solely due to local variations of the environment. On the current evidence, this riverine/maritime culture can be traced about 3,000 years into the past.

Athabascan speaking people occupied the watershed analysis area at the time of Euro-american contact, although they are considered relative latecomers to the region. The Athabascans may have brought with them a way of life more strongly oriented to riverine resources, displacing groups who followed a subsistence orientation characterized by a greater reliance on the uplands. The Athabascans are linked to changes in settlement pattern and technology which appear in the archeological record about 1,500 years ago along the coast and in the interior of southwest Oregon. These coastal groups, whose territories also extended up the coastal rivers, spoke various dialects of the Athabaskan language. Collectively these Athabaskans are referred to as the Tututni or Coast Rogues, although each band had its own name.

Ethnographically, the Tututni are representatives of the final cultural period in southwestern Oregon. These Athabaskan peoples inhabited much of southwestern Oregon from the beaches to the upland forests. They occupied the region from south of Bandon, Oregon to northern California and extended up the major drainages like the Smith, Chetco, Pistol, Illinois and Rogue Rivers. The bands were numerous and the locations diverse.

According to an 1854 map and census compiled by J.L. Parrish, Indian Agent for the Port Orford District, the watershed analysis area was utilized by a Tututni band called the Shasta Costa (also called the Chasta Costa or Shas-te-koos-tees). The Shasta Costa's occupied the area surrounding the Rogue River from the Illinois to Big Bend and up the Illinois River. According to this map the "Shas-te-koos-tees" numbered 146 individuals with their major "chief" being Yah-chum-see. Parrish describes the bands holdings as "reaching back from the coast indefinitely". A later map, a compilation of the works of Alex Ross and E-ne-a-ti, 1884, and a research paper by Jay Miller and William Seaburg indicates that the watershed was shared by two groups: the "Shis-Te-Kus-Tunne at the forks of the Rogue and Illinois Rivers, and the Ta-Ko-Be-Tunne reaching up the Illinois River to the Applegate valley. Whether these groups maintained strict territorial boundaries delineating upland resource areas is unclear.

The general pattern of Tututni settlement indicates that large winter villages, containing 50 to 150 individuals, were established along coastal areas, rivers and major streams. Houses constructed at village settlements were substantial, consisting of semi-subterranean structures with bark or plank walls and gabled roofs about twelve to sixteen feet square. Each house had a central fire area with a small smoke hole above. The earthen floor was packed solidly to keep out moisture and was often covered with mats of cattail fibers. Another structure constructed in the village site was the sweathouse. Built by the men of the village this was a semi-subterranean, earth covered structure with an entry on one side and a hole for dropping down fire heated rocks on the other. The sweathouse could be sealed to more effectively hold in the heat. These villages served as semi-permanent habitation spots, where foods collected throughout the year could be stored for use in the winter. In the summer, when traveling to fishing sites or food gathering locations these people erected simple brush shelters around a central fire pit.

Major Shasta Costa (Tututni) villages were known to have existed at the confluence of the Rogue and Illinois Rivers (tle' geet-tlinten, 35CU59), the point of land which is now the town site of Agness (cecl-gut tun'ne), at Big Bend (se-e'ltanitcu), the terrace above the mouth of Shasta Costa Creek (yetce'wet, 35CU161) (Waterman, 1921) and at Oak Flat (SK-108) on the Illinois River.

The Oak Flat Village Site (SK-108) is on a sharp bluff, about 100 feet above the Illinois River, at the upstream end of Oak Flat. Oak Flat is a large meadow some six miles upstream from the mouth of the Illinois. The site is partially obliterated by a gravel road, a summer cabin and encroaching trees. It has never been excavated and is only poorly documented. Although it has never been excavated, parallels may be drawn to what life must have been like in this village by comparing it to the Shasta Costa Village Site, 35CU161. Winthrop and Gray did a limited amount of testing at this site in 1988 due to the site being repeatedly vandalized and damaged by erosion.

Generally, the Tututni were hunter-gatherers, subsisting on a diet consisting primarily of salmon and acorns and supplemented by a variety of game and collected food items. A seasonal round of activities was practiced which is characterized by dispersed, small task-specific groups utilizing the upland areas during the spring and summer months. These hunting and gathering groups would traverse the upland areas in search of game, plants, nuts, berries and other raw materials. Temporary camps in the uplands consisted of grass covered, brush or animal hide shelters. Fall signaled the time for communal fishing and acorn gathering and the occupation of winter villages by multi-family groups. In winter, these people would subsist largely on stored resources collected during the summer and fall.

The material found in the various sites in the watershed indicates considerable use of the river corridor and the resources contained in and adjacent to the river. Like other Indians along the northwest coast of this continent, the tribes of southwest Oregon made extensive use of fish resources, especially the salmon. The fish of the Illinois River and its tributaries were the most important of animal foods. Communal fish weirs and fishing scaffolds were erected in the waterways where, due to the abundance of the fish runs, the basic food resources for an entire year could be procured in a few weeks of work. In addition to fish weirs, these people used many techniques for taking fish: dip nets, basketry fish traps, hook and line, nets and spears were all used to collect this important resource.

The coastal Athabaskans also had access to a vast array of subsidiary animal foods provided by the shoreline environment. Women and children easily collected chitons, limpets, clams, snails, barnacles, sea urchins and crabs in the estuaries and tide pools. Sea mammals such as seals and sea lions were other marine animals exploited by the coastal natives along with an occasional beached whale. Inland groups probably made seasonal trips to visit their coastal relatives and obtain the resources provided by the ocean through trade and barter.

For the Athabaskans living away from the coast, the dependence upon camas and acorns was much more significant than for the residents along the sea. For inland peoples the acorn became the most important staple in the diet. The Athabaskans preferred the acorns of the tanoak, but in years of poor tanoak acorn production, the acorns of white and black oaks were also utilized. The acorns were ground into flour by use of a flat stone and a basket hopper with a open bottom. The acorns were then leached free of tannic acid by placing the flour in a bed of sand and repeatedly pouring water over the flour. The dough was then stone boiled in a basket to produce a mush. Camas and brodelia bulbs were baked in stone lined pits and were also important plant foods.

The hunting of big game, especially deer, elk and bear were also of great importance to the diet. Covered pits and game drives utilizing deer fences and snares were commonly employed as well as the bow, arrow and spear. Small game, seeds, insects, berries, birds and eggs also rounded out the diet of these inventive peoples.

It has been typical of Euro-americans in the past to assume that Native American hunting and gathering societies had very little direct control of or impact upon the territories they occupied. However, a re-examination of the literature, coupled with more careful interviews with Native infonnants, has turned up a wealth of data about intensive management techniques employed by indigenous peoples. The most powerful of all control methods was the use of fire. Reasons for the use of fire included game drives, maintaining wildlife habitat, procurement of tarweed and grass seeds, acorn gathering and oak grove management, hazel gathering and management, improving the quality of basketry materials, root and berry propagation, extraction of sugar pine sap and seeds, insect collection, tobacco cultivation, warfare, communication and ceremonal purposes.

Various tools and other artifacts not only establish site locations, but also reveal the types of resources being utilized and the types of technologies being performed. A number of sites and isolated finds have been located within the watershed and are representative of the common upland site types found in the Siskiyou National Forest. These include temporary campsites related to hunting and gathering activities such as SK-052, the Game Lake Lithc Scatter and SK-364, the Silver Prairie Lithic Scatter. Artifacts found in these temporary campsites include lithic debitage, the waste material from the manufacture of stone tools, and the tools themselves, such as projectile points and scrappers. Temporary campsites are often located on or near major ridgelines which were used as travel routes, or in areas where diverse vegetation encouraged the collection of unique resources. Meadow areas where the gathering of grass seeds or flowering tubers such as camas are an example of the latter mentioned site locations.

Another upland site type common on the Forest but not found in this watershed analysis area is the lithic quarry. It represents a site where the procurement of raw materials for the production of stone tools was the focus of activity. Pits dug into outcrops of chert, a cryptocrystaline stone capable of being knapped, and extensive surface rubble from lithic reduction activities typify this site type. Dcbitage is predominantly large blocky shatter and flake fragments typical of early core shaping activities. Hammerstones of a material not native to the site are also common. These hammerstones range from softball to pebble size. This range represents the lithic reduction sequence from course quarrying work to the fine work required to shape a biface.

A third site type relating to the formation of stone tools may be described as the lithic workshop. SK-1115, the Oak Flat Camp Lithics, is a buried lithic deposit composed entirely of small tertiary debitage diagnostic of the final stages of stone tool production, retooling and sharpening. This site is located on the same river terrace as the Oak Flat Village Site, SK-108, although on the opposite end of the terrace. It may represent a workshop "satellite" to the main village where a specific task may have been carried out. It should be noted that the entire terrace and surrounding areas are treated as one large site.

Other types of sites which can be found within the watershed offer insights to the religious and spiritual nature of the Native Americans in the area. SK-131, the Indigo Ridge Vision Quest Site, and SK-176, the Oak Flat Vision Quest Site are examples of this site type. SK-131, the Indigo Ridge Vision Quest Site, consists of two definite rock rings and two other probable rings situated on a rock outcrop along a razorback ridge providing a commanding view looking upstream along the Illinois River drainage. The vision quest rings are circular walls of stones four feet in diamcter and one to one and a half feet in height. The pits are large enough to contain one person and are arranged in a semi-linear orientation. SK-176, the Oak Flat Vision Quest Site is also located on a sharp ridge, but consists of only one rock ring. However, this ring is large, ten feet in diameter and 22 inches high. As with SK-131, the site offers an excellent view of the Illinois River valley, especially Oak Flat. This site retains a high degree of physical integrity, while SK-131 has been damaged in the past. These sites are outstandingly significant, Class I cultural resources as they represent a traditional socio-religious practice of the native peoples. Not many of these vision quest sites have been found in southwest Oregon.

The vision quest was one of the most fundamental and widespread religious concepts of North American Indians, including the inhabitants of southwest Oregon. Certain rites of passage were key in the life cycle of these aboriginal people, the vision quest being one of the most important. Young men and women performed this rite at puberty on the bald peaks and headlands of the region. The vision quest was undertaken to seek a guardian spirit and to obtain supernatural power. The vision seeker sought the aid of the spirit world through prayer, dreaming, fasting, dancing and going without sleep until a guardian spirit came to the candidate in a vision. An individual could undertake more than one vision quest in his or her lifetime in search of spiritual aid and guidance.

The major ridge tops that surround the watershed were also used by the aboriginal inhabitants as trade and travel routes. As previously mentioned, temporary campsites are often located along these ridge tops. Evidence of trade can be assumed from the artifacts found in various sites. The presence of material such as obsidian, not native to the area, is proof of intercourse with the interior regions. Sourcing of obsidian from various excavations indicates a widespread trade network reaching into northern California, south central Oregon and the central Cascades. In exchange, coastal products such as shells, dried salmon, salmon oil, deerskins and wapato root found their way inland. Historically, trails and later roads often followed these aboriginal travel routes.

From an examination of the historic and ethnographic record, it does not appear that the lands inhabited by the Tututnis were heavily occupied at the time of white contact. However, there are some indications that the population had declined dramatically because of disease even before Euro-Americans arrived in southern Oregon. Dr. Lorenzo Hubbard, speaking about the Tututni residents of the lower Rogue River in 1856, said: "According to tradition, many years ago they were far more numerous than at the present time, wars and diseases having in some instances destroyed whole tribes. The marks of old towns and large settlements everywhere found, now entirely deserted, are strong evidence of the truth of their traditions." (Hubbard, 1861)

Glimpses of these people and their way of life have been made known to us through ethnographic information, the journals and manuscripts of the early white explorers and settlers, records and accounts from the Rogue Indian Wars and the archaeological record as it pertains to the Northwest Coast Culture area. The ethnographic information that exists for these people was acquired from research conducted at Siletz and Grande Rhonde reservations and the Smith River rancheria. However, by the time the interviews or ethnographic sketches were compiled in the late 1800s and the early part of this century, most sources of information were already a generation removed from tradition.

What were the historic uses of the watershed?

The historic period in this portion of southwestern Oregon begins as early as the 16th and 17th centuries with the voyages of the Spanish explorers. The earliest recorded contact between the coastal natives and Europeans is noted in the log of Captain George Vancouver in 1792. Within the next quarter century trappers and traders, including North West Company fur trader Peter Corney and an American party of trappers led by Jedidiah Smith, appeared in southwestern Oregon. Russian fur hunters, traders, and whaling ships of various nations also had contact with the native people on this portion of the coast.

The Gold Rush

Some of the first Euro-american settlers in the area were miners attracted to the region during the gold rush era. In 1849 gold was discovered at Sutter's Mill in California and prospectors flocked through the inland valleys following the California-Oregon Trail. Very quickly, the richest gold producing areas of California were claimed and late coming prospectors spread out into the surrounding countryside in their quest for precious metals. By 1851 the prospectors had reached southwest Oregon and in that year the first discovery of gold in Oregon occurred on Josephine Creek. Other gold strikes were soon to follow. Gold was first discovered on the coast at places like Whiskey Creek and Gold Beach, named for the gold rich, black sand deposits found there. Later, gold deposits were found in the Rogue River.

Early prospectors left little of the local country unexplored and in the ensuing years every area along the Rogue and Illinois Rivers with gold in sufficient concentrations was mined. Mining within the watershed lasted from the middle of the nineteenth century through the 1940s. The search for gold in the Rogue and Illinois Rivers has had and continues to have an effect on the social and economic conditions, past and present of Curry and Josephine Counties.

The Nancy Creek Cabin (SK-099) and the Nancy Creek Mine (SK-098) are representative of this phase of cultural development within the watershed. It stands as an example of historic use in the National Forest as a reminder of the remote living conditions typical of miners of the 1850s. There is some discrepancy as to the identity of the original builder as well as the time period when it was built. According to local sources, Bill Kessler built the miners cabin in the 1890s. Other accounts credit Bill Rumley, the regions first black individual (year unknown); credit as well, is also given to Fred Voit who may have built the cabin in 1926 or 1927. It is known from the Curry County records that the original mining claim was filed on October 18, 1915 by the B & B Mining Group. The two partners in the company were T.J. Brown and F.M. Beagle. Fred Voit acquired an interest on the claim in the early 1920s, and the cabin and claim have passed through a number of hands since that time.

The Nancy Creek Cabin and Mine Site is a multi-component heritage resource consisting of a log residence, a pole and shake rectangular tool shed, an outdoor use area with a fire pit, outhouse, and various smaller structures. Hand crafted features and furniture display creativity and an ability to improvise that were the trademarks of many backwoods builders. A trail connects the habitation area with the mine site itself. Historical features at the mine include various ditches, tailings, and shafts. An ore mill with an arrastra was, at one time, also present on site.

Many of the sites found in the analysis area are associated almost strictly with prospecting and mining. Only a handful of settlers and miners were living in the lower Illinois River region in the late 18th century and almost all were involved in some type of prospecting activity. Mining and prospecting sites within the watershed include: SK-698, Campbell's Claim and Cabin, SK-699, Deadman's Flat Claim and Cabin and SK-345, the Hugo Mayer Homestead. Other mining sites can also be found in the surrounding areas and tributaries of the lower Illinois River. Large mining districts were eventually established on the Rogue and Illinois Rivers as well as in what is now the Kalmiopsis Wilderness.

When initial contact was made between Euro-american and native cultures along the southwestern Oregon coast relations can be characterized as generally friendly, or at least the cultures avoided one another. However, this situation rapidly deteriorated. During the period between 1840 and 1855 thousands of transient miners and permanent settlers entered southwest Oregon. Merchants, packers, and farmers soon followed them. Encouraged by the Donation Land Act of 1850, the majority of the newcomers who would become permanent residents entered the area in the years between 1850 and 1855. The consequence of this increased emigration was competition between the cultures for space and resources. This situation, coupled with racial and ethnocentric biases, eventually lead to armed conflict in 1853. Ultimately, ill feelings between the native populations and the Euro-americans exploded into the Rogue River Indian Wars of 1855-56.

The Rogue River Indian Wars

Significant events of this conflict took place within the watershed analysis area. Near the conclusion of the Rogue River Indian Wars the Oak Flat area was the site of a number of meetings between the combatants. In January of 1856, following the murder of two miners, Lieutenants John Chandler and John Drysdale along with seventeen men traveled to the villages near the mouth of the Illinois River. Their mission was to apprehend a Canadian Indian who was guiding the miners, and convince the peaceful bands to leave their plank house villages and move to the coast. They were not successful in either objective and withdrew to the coast settlements.

By May of 1856, Colonel Robert Buchanan, commander of the coast military operations, had launched a campaign up the Rogue River. Dividing his forces to travel up both sides of the river, these troops made an arduous trip through the Coast Range eventually reaching the meadows at Oak Flat on the Illinois River (site SK-107). Conferring with several of the native leaders whose people were hiding in the area, Buchanan instigated the so-called "treaty" of Oak Flat. Under the terms of this arrangement various bands of Tututnis and Takelma agreed to assemble at the "Meadows" at the Big Bend of the Rogue River to surrender. The soldiers and volunteers were confident that the rendezvous would end the war.

Following the treaty meeting at Oak Flat, Captain A.J. Smith and a reinforced company of Army Dragoons proceeded to the Big Bend of the Rogue River to accept the surrender of several of the Indian bands. Smith was informed that his company might be attacked and he withdrew his forces to a defensive position. The following morning an Indian force composed of various inland and coastal bands and led by Chief John, an Applegate River Takelma, advanced on the soldiers. The fighting continued for 30 hours and it was only the arrival of Captain C.C. Auger with a company of infantry that saved the embattled force. The Indians were forced to withdraw from the field. The Battle of Big Bend was the last significant battle between the United States Army and the various tribes of southwest Oregon during the Rogue River Indian War.

For the Indian warriors the battle became a defeat snatched from the jaws of victory. For the soldiers the battle was, at best, not a defeat. Nevertheless, the result of the battle broke the fighting spirit of the Indians and essentially concluded The Rogue River Indian War. The bands soon surrendered and the "hold-outs" were tracked down and captured. The majority of the native population was forcibly removed to the Siletz and Grande Rhonde reservations. With the removal of the native inhabitants at the conclusion of the war, the area was opened to settlement.

Euro-American Settlement

Early settlers and miners trickled into the upper Rogue River and Illinois River areas during the 1850s and 1860s. They often built their homes on the same river or stream terraces that had provided homes for the native inhabitants. The remoteness and difficult access precluded extensive development and most people followed a subsistence-orientated way of life. This lifestyle made maximum use of the available fish and game, supplemented with produce grown and animals raised on small farms. The grassy ridge tops were attractive to early stockmen and are often the sites of early homesteads. Goods and services were traded, bartered and scavenged. Cash earning activities were limited and population densities low. Small-scale mining, and the sale of livestock and fish provided some income to local residents. Archeological sites, which chronicle historic settlement within the watershed, include cabin remains, trails, mines and camps used by miners, homesteaders and packers.

In the summer of 1868 a pack train carrying supplies, children and pregnant women slowly made their way to the confluence of the Rogue and Illinois Rivers, the site that would become Agness, at the downstream end of the watershed analysis area. About twenty men, women and older children walked and drove a few cattle along with the pack train. Younger children were stowed away with the baggage. This group of immigrants hailed from the Klamath River gold country, but tired of poor mining results there, they would chance better opportunities on the Rogue River and its tributaries. Names such as Billings, Fry, Southard and Rumley, all members of the pack train, would live on in the area until this day. The travelers and their children would scatter throughout the river canyon, finding places to plant fruit trees, break trails, build cabins and mine the ground.

Abraham and Jim Fry along with their Karok Indian wives, Sinnah and Eliza, established their homesteads on the lower Illinois River in 1868. Abe Fry settled on the west side of the Illinois at the mouth of Fox Creek, while Jim Fry's homestead was located on Oak Flat (SK-1107). Long a prime living space, Oak Flat still bore the signs of Indian camps and villages which had been inhabited only fifteen years earlier. The open, flat land continued to offer the same rich life source it had provided earlier residents. Abe and Jim Fry prospected and mined in the Illinois River canyon and one of their first ventures recorded was on Indigo Creek with John Billings, a member of the original immigrant train.

The Fantz (Briggs) Ranch, SK-210, is a prime example of the homesteading efforts of these early Curry County pioneers. The large, 72-acre meadow is perched on a terrace above the Illinois River. Phillip Hancock originally obtained it through a land patent from the Roseburg Land District in 1909. The land was surveyed in 1914 by Norman C. White, Assistant Forest Ranger, for the General Land Office (GLO) survey and was entered into this system as Homestead Entry Survey (HES) #118. This survey plat was accepted by the GLO in 1916.

In 1921 Robert Fantz acquired title to the property at a sheriffs sale in Grants Pass for $950.00. Bob Fantz and his wife Annanette (Bruun) Fantz had come to the Illinois country a few years earlier for his health. They were regarded as substantial citizens and ran cattle on their meadows and in the woods nearby. The ranch consisted of a substantial cabin and barn as well as several outbuildings hand split from the surrounding forest. The windows, nails and other materials which could not be produced on site were carried in on packhorses the twelve miles from Agness. Ironically, this idyllic scene would end tragically with the murder of Bob Fantz by the unstable, so-called "Hermit of the Craggies", Hugo Mayer. While Bob Fantz was checking on his cattle, he was ambushed and shot out of his saddle, dying quickly. Mayer was eventually tracked down and admitted to the killing. Fantz is buried in a small cemetery at his homestead along with another prospector of the Illinois River canyon known only as "Happy Jack".

Five years after the death of Robert Fantz, the homestead was sold to Warren and Anna Briggs who continued to run cattle on the ranch. They retained possession until selling the property to the Pierce Lumber Company in 1977. Eventually, the homestead was traded by Pierce to the Forest Service in a land trade that was completed in 1993.

As settlement of the lower Illinois River corridor slowly grew, the amenities of civilized life bloomed as well. In the 1870s a school house and rural community meeting place, SK-008, the Oak Flat Schoolhouse, was established at the northern end of the Oak Flat prairie. The Agness post office first opened its doors in 1897. Agness, at the confluence of the Rogue and Illinois Rivers, served as the end of the riverboat supply and mail run from Gold Beach. The lack of roads throughout the area caused riverboats and pack trains to serve as the principle forms of transportation in the region. SK-104, the Oak Flat Cemetery, is a tangible link between the early days of settlement with the descendants of those early pioneers still living in the area today.

The U.S. Forest Service

The Siskiyou National Forest was established on October 5, 1906. Henry Haefner, an early forester in the area states, "In 1909 the National Forest area was about as the Indians had left it. Nothing of importance had been done to improve the property or even find out what it contained in the way of timber or other natural resources." The early foresters duties included mapping, estimating the amount of timber and agricultural land, law enforcement, fire protection, as well as a multitude of other jobs involved with the administration of a large timberland. The rangers often built their own stations and headquarters.

Various trails, lookouts, camps, guard stations and telephone lines were constructed within the watershed during the first three decades of this Forest's history. Wildhorse Lookout was first established in 1947 as a Standard '36 L-4 house mounted on a forty foot sawn lumber tower with a catwalk. The Standard '36" model was characterized by a hipped roof, two-over-two light windows and door, and ceiling joists which extend two feet beyond the cabin to support the shutters. Major interior features include wood built in cabinets and an Osbourne Firefinder. Wildhorse Lookout, as with other lookouts in the general area, is significant for its critical role in the development of the fire detection and suppression system in rugged southwest Oregon. The station helped assure that a reliable and abundant timber supply would support Curry Counties post World War II economic growth. Early communications in the watershed consisted of primitive phone lines connecting the various lookouts to the ranger stations and the town of Gold Beach. Examples of these lines of communication are: SK-604, the Snow Camp Phone Line and SK-1113, the Pine Grove Trail #27A and Phone Line.

An important component of the historic fabric of the watershed is the trail system. These transportation corridors were the first travel routes within the watershed. Many of these paths followed older aboriginal routes. "Chief" Elwin Frye identified SK-1113, the Pine Grove trail #27A and large portions of the Illinois River Trail as Indian travel routes. Frye was a packer for the Forest Service and the grandchild of early Rogue River settlers John and Adeline Billings. Other historic trails within the watershed include: the Game Lake Trail #70 (no site number) and Trail #1173, the Pebble Hill to Game Lake Trail (no site number). Trail systems effectively linked the coastal area with the interior of the Forest, and the interior with the Rogue Valley. Many were routes that the miners, and the packers that supplied them, established to get their materials to and from the prospects. Others were used to drive cattle to summer pasture. During the first three decades of the Siskiyou National Forest's history, the trail systems were improved and expanded. Today many Forest roads follow these historic trail routes. Other remnants of these trail routes form a portion of today's recreational trail system.

The Depression Era

The Depression of the 1930s brought an influx of people to the public forest lands. Numerous out of work individuals sought survival in the mountains undertaking a subsistence economy lifestyle just as the earlier settlers had. These people were also engaged in prospecting and small-scale mining encouraged by the revaluation of gold. Some of the older claims and gravel bars along the river were probably re-worked at this time.

In the 1930s the federal government created through New Deal legislation a number of programs of work-relief to combat the impact of the depression. In southwest Oregon the development of the Civilian Conservation Corps (CCC) formed an important chapter in the local history. Fire prevention and suppression, tree planting and timber stand improvement, range improvement, soil conservation, road building and forest facilities construction were all undertaken by the CCC volunteers. The Civilian Conservation Corps provided employment and a measure of financial relief for the enrollees and their families.

After completing their basic training at Fort Lewis, Washington, the first CCC units were assigned to Agness, Oregon (SK-695) near the mouth of the Illinois River. The original contingent of thirty men were soon re-enforced by more and more CCC units. At Agness the challenges involved the difficulty of getting supplies, equipment and materials to the project areas. During their first summer and fall the Agness unit cut the first cat road between Agness and Illahe. During the same time period, they also constructed a new suspension bridge across the Rogue River, laid out an airport in Illahe, constructed their own camp and erected four new buildings at the Agness Ranger Station (SK-119). The materials and techniques used to build the Agness Ranger Station is a premiere example of Civilian Conservation Corps construction methods.

The Modern Era

In the early decades of the twentieth century recreational use of the streams, rivers and forests has added a new economic emphasis to the area. Guides and packers often adapted older cabins and camps to their new enterprises and a new breed of recreational hunters, fishermen and ecologically inspired tourists provided an alternative income to the local economy. Agness maintained its position as an important terminus for the river boats and enjoyed the added benefit of income generated by tourists. As roads were constructed in the area, logging became a significant contributor to economic growth throughout the region.

Even though the historic element is by far more tangible than that of the prehistoric, much of this cultural fabric within the watershed is little known. Many of the sites in the watershed have not been formally documented or evaluated for their historic significance.

Does the watershed contain any culturally significant traditional use areas?

There is no evidence which suggests that the area within the watershed is presently used for traditional activities by local Indian groups. Recognized tribes consulted (Tolowa, Karok, Coquille and Siletz) did not provide any additional information regarding traditional use in the watershed analysis area.

The Confederated Tribes of Siletz have, for the past few years, used the Oak Flat Meadow as the destination site for their yearly "Run to the Rogue" ceremonies. This event commemorates the forced removal of these bands of Indians from the area and represents a reverse "trail of tears" back to their homeland. The Gold Beach Ranger District does not require a special use permit for this event. It is their intention to continue this practice and, if possible, establish a permanent site where they could construct a ceremonial lodge and camp. The Siletz Tribe has also expressed an interest in gathering traditional forest products such as pine nuts, lodge poles and beargrass. If requested, the gathering of forest products would be administered by the standard permit system.

Information Needs: The complete status and number of cultural sites in the watershed are unknown. Formal site evaluations of many sites have not been conducted.

Management Opportunities: Cultural resource surveys will precede all ground disturbing projects. All sites discovered will be documented and added to the Forest inventory. The significance of inventoried sites shall be evaluated for eligibility for the National Register of Historic Places. Suitable cultural resource properties may be interpreted for recreational use and educational benefit of the general public. There is an opportunity for partnership with the recognized tribes in the development of recreational and educational programs.

What are the major recreational uses in the watershed and where do they occur?

The Lawson Creek Watershed Analysis provides a detailed discussion of recreational opportunities in the Lawson Creek portion of the Lower Illinois watershed while the following documents the recreational opportunities in the rest of this watershed.

The Lower Illinois Watershed provides a diversity of recreation opportunities including camping, hiking, rafting, recreational driving, mountain biking, motorcycling, horseback riding, hunting, catch and release fishing, wildflower viewing, and botanical study. The primary area where recreational activity occurs is the Illinois River corridor. Some recreational driving and related activities also occurs in the upper part of the Fall Creek watershed. The amount of recreational use in the watershed is unknown except for the number of people rafting on the Illinois River and the number of people hiking on the Illinois River Trail.

The primary Recreational Opportunity Spectrum classification in the watershed is Roaded Natural due to the roads paralleling the Illinois River. Currently there is a gravel road on the west side of the river that accesses private residences and property. On the east side of the river, there is a single-lane paved road that accesses private residences and the Oak Flat area. The portions of the watershed along the

Illinois River Trail and in the Fox Creek drainage are classified as Semi-Primitive Motorized, since these areas can be accessed by motorcycles during a portion of the year. The area south of Nancy Creek is classified Semi-Primitive Non-Motorized, since there is no roaded access in this area.

Historic Recreational Use

Early recreational activities in the watershed were likely horseback riding and boating. Hunting and fishing were subsistence activities that over time have become recreational activities. Trails in the watershed provided access for Native Americans, followed by miners, and settlers. A map of the Siskiyou National Forest in 1911 shows a trail on the west side of the Illinois River, going through the Lawson watershed, and up to Game Lake. The 1915 map shows a trail on both sides of the Illinois River, and a trail going to Silver Prairie. The river and the trails provided access for the settlers in the area until the 1930s. The 1937 map was the first that showed a road going to Oak Flat. In the 1960s, roads were constructed primarily for timber harvest, and the road from Gold Beach to Agness was completed. This brought an increased amount of recreation to the area, and for the first time road-related recreation activities, such as driving, camping, and hunting.

Current Recreational Use

Today most of the recreational use in the watershed is concentrated in the Illinois River corridor. One of the most popular sites is the gravel bar at Oak Flat. This site provides dispersed camping; day use for picnicking and swimming; the take-out point for people who float the Wild Section of the Illinois River; and the lower trailhead for the Game Lake Trail #1169.

The dispersed camping area has 10 sites and is popular during the summer months, especially on weekends. No fees are charged at this site, since the only improvements are two pit toilets. This site is also popular with local residents for swimming and picnicking.

The gravel bar is the take-out point for people who have floated through the wild section of the Illinois River. The Illinois River was designated Wild and Scenic in 1984. The wild section starts at Briggs Creek and ends at Nancy Creek, approximately one mile upstream from Oak Flat. From Nancy Creek to the confluence with the Rogue River, the Illinois is classified as recreational.

The wild section is known for its exceptionally rugged and undeveloped character. The number of camping sites along the river are few and small. There is an average of 290 people who float the wild section each year. The actual number varies widely each year due to river flows and weather conditions. There was a low of 65 floaters in 1978 and a high of 529 floaters in 1998. Most of the floaters are private, but two commercial companies have permits to float the river. The float season is short and generally occurs from early-March to mid-May when the river flows range from 300 to 2500 cubic feet per second. The river flows on the Illinois can fluctuate greatly. Heavy rainstorms or rain-on-snow events can raise the flows to treacherous levels in a short period of time. Once floaters put-in, there is no point where they can easily take-out until they reach Oak Flat. Over the years, several people have drowned and even more have been rescued after they became trapped by the rapidly-rising river.

The Illinois River Management Plan (USFS, 1985) calls for a mandatory self-issuing permit system with no restrictions on use until such time that the use exceeds two trips per day for any 10 or more days during the use season in two consecutive years. At that time, a limit on the permits will be initiated where the number of parties will be limited to two per day, for both commercial and private parties, and the size of the parties will remain limited to 12 individuals including guides. Please refer to the Management Plan for additional information on the Illinois River and its management.

The gravel bar at Oak Flat is the lower trailhead for the Game Lake Trail #1169 which goes through the Lawson Creek watershed to Game Lake. Hikers have to ford the Illinois River to reach the trail so use on the trail is limited to the summer months.

A very popular trail in the watershed is the Illinois River Trail #1161. The trailhead is at the south end of Oak Flat before the road goes down to the gravel bar. This trail receives much of its use during the spring for wildflower viewing and botanical study. In 1999, approximately 1500 people used the trail. This trail accesses the lower portions of Silver Creek and Indigo Creek; private property known as Indian Flat just outside the watershed; Fantz Ranch which was acquired by the U.S. Forest Service in a land exchange in 1993 (see historical section of this analysis for more information on Fantz Ranch); and the Kalmiopsis Wilderness. The trail ends at Oak Flat near Briggs Creek. This trail also accesses the Hardscrabble Trail #1165 in the Indigo Creek watershed and the Silver Peak/Hobson Horn Trail #1166 in the Silver Creek watershed.

The lower trailhead for the Pine Grove Trail #1170 is at the confluence of the Illinois and Rogue Rivers at the Illinois River Bridge. This is another popular trail but lies primarily outside of this watershed.

Information Needs: Additional information on the amount of recreation use in the watershed could be obtained.

Management Opportunities: Facilities at the Oak Flat dispersed camping area could be improved. Picnic tables and fire rings could be provided. Plantings and boulders could be placed to control vehicle access and provide erosion control. Blackberry mowing should continue at this site to prevent the spread of this noxious weed. At some point in the future, the pit toilets will need to be replaced. The access road down to the camping area needs to be repaired and maintained to prevent erosion and to provide safe access.

The trailhead for the Game Lake trail could be better defined and better directions to the trail across the river could be provided. The Illinois River Trail needs tread and vegetation maintenance, and reconstruction at certain portions of the trail. Specific areas include a slide area near Silver Creek, and both the Indigo and Silver Creek bridges. The lower trailhead for the Pine Grove Trail could be moved from the Illinois River Bridge where the parking is inadequate, to the intersection of Roads 33 and 3300250. There are Port-Orford-cedar concerns with this location that would need to be investigated before this change is implemented.

The old buildings at Fantz Ranch are becoming safety problems and need to be obliterated.

Mining

Mining began in the watershed during the gold rush era of the 1850s and 1860s. See the "historic uses in the watershed" portion of the watershed analysis for more information on the historic mining that occurred in the watershed.

When the Illinois River was designated Wild and Scenic, the Wild Section of the river was withdrawn from mineral entry except to valid mining claims. Today, there are no active mining claims in the watershed. Exploration and panning by individuals is known to occur.

Table 15. List of Roads (excluding roads in Lawson and Horse Sign watersheds)

Road Number	Length (miles)	Maintenance Level	Jurisdiction	TNA Class	Open/ Closed	Est. Cost of Deferred Maintenance (Mtnc level 3 and above only)
3577350	2.45	2	Forest Service	S	*	
3577351	2.09	2	Forest Service	S	Open	
3577352	0.19	2	Forest Service	C	Open	
3577355	1.27	2	Forest Service	C	Closed	
3577357	0.44	2	Forest Service	C	*	
3577359	0.74	2	Private	-	Open	
3300270/ County 450	3.07	4	County	-	Open	
3300271	0.50	3	Forest Service	P	Open	$15,000
3300272	0.62	2	Forest Service	S	Open	
3300273	0.26	2	Forest Service	S	Open	
Spud Road	2.0	2	Private	-	Gated	
3300250	2.78	1	Forest Service	C	Closed	
3300250	0.77	1	Private	-	Closed	
3318120	1.20	2	Forest Service	S	Gated	
3318124	0.78	1	Forest Service	C	Closed	
3318125	0.08	1	Forest Service	C	Closed	
3318126	0.22	1	Forest Service	C	Closed	
3318127	0.40	1	Forest Service	C	Closed	
Total	19.86 miles					

*Road 3577350 was closed by a slide at milepost (m.p.) 1.0 in the mid 1990s. Within this watershed, 0.2 miles are open and 2.25 miles are closed, blocking access to Road 3577357. Road 3577350 is scheduled to be reopened by the State of Oregon in the summer of 2000.

Note: the highlighted ones are those I know are actual references. Please review and check your references so I can be sure your section has the proper references. Thanks! Mary

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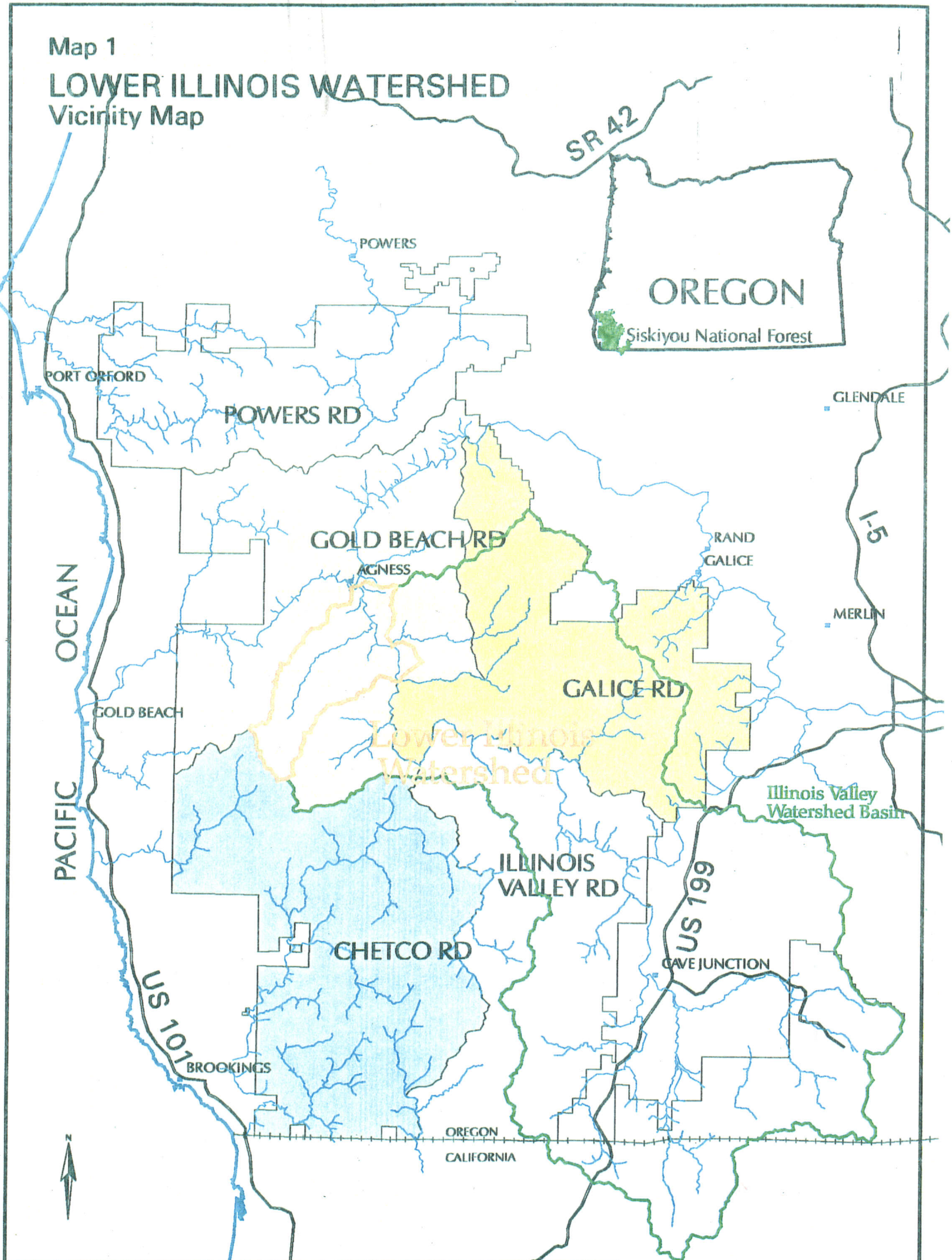
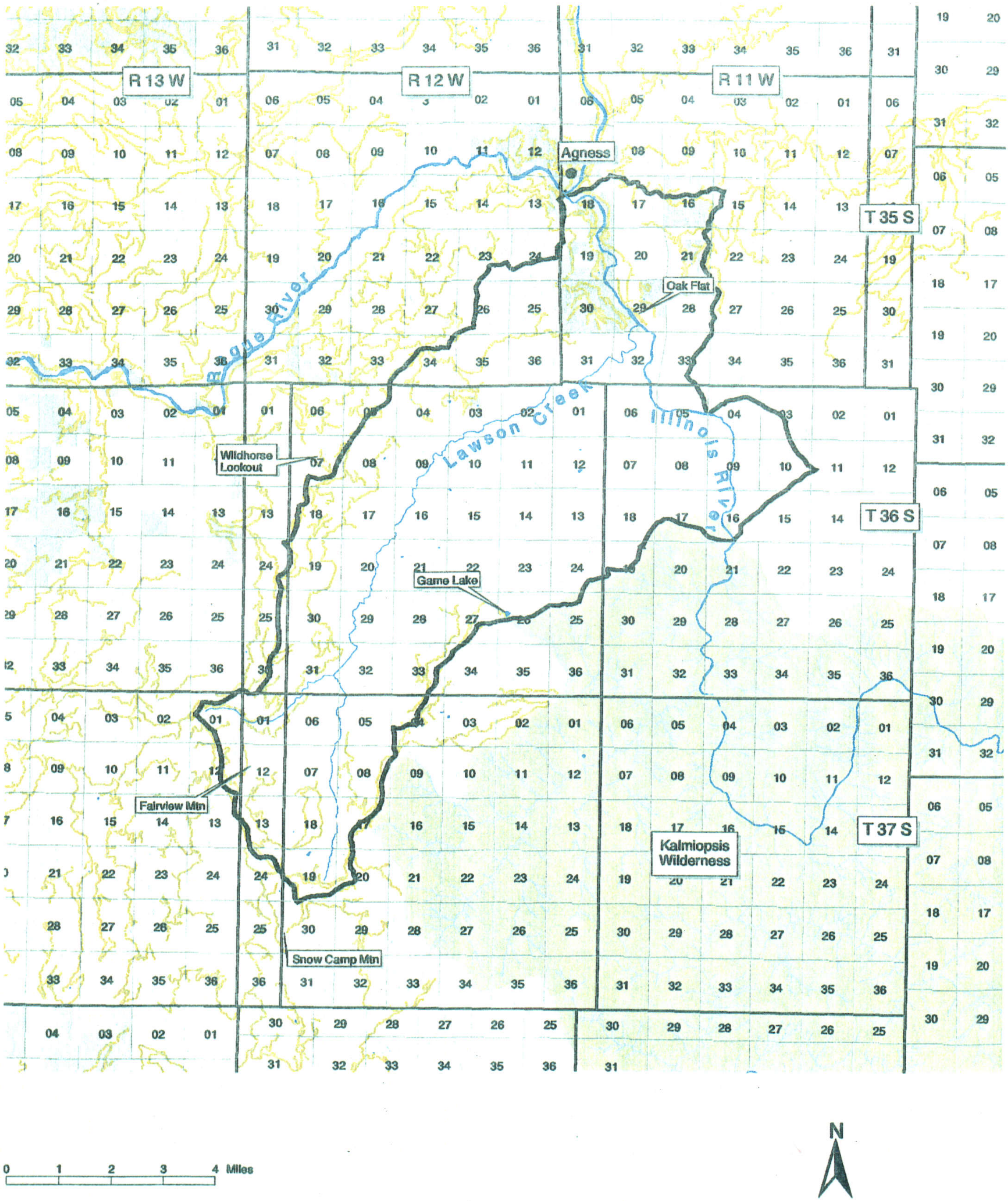


January 18, 2000

Map 2

LOWER ILLINOIS WATERSHED

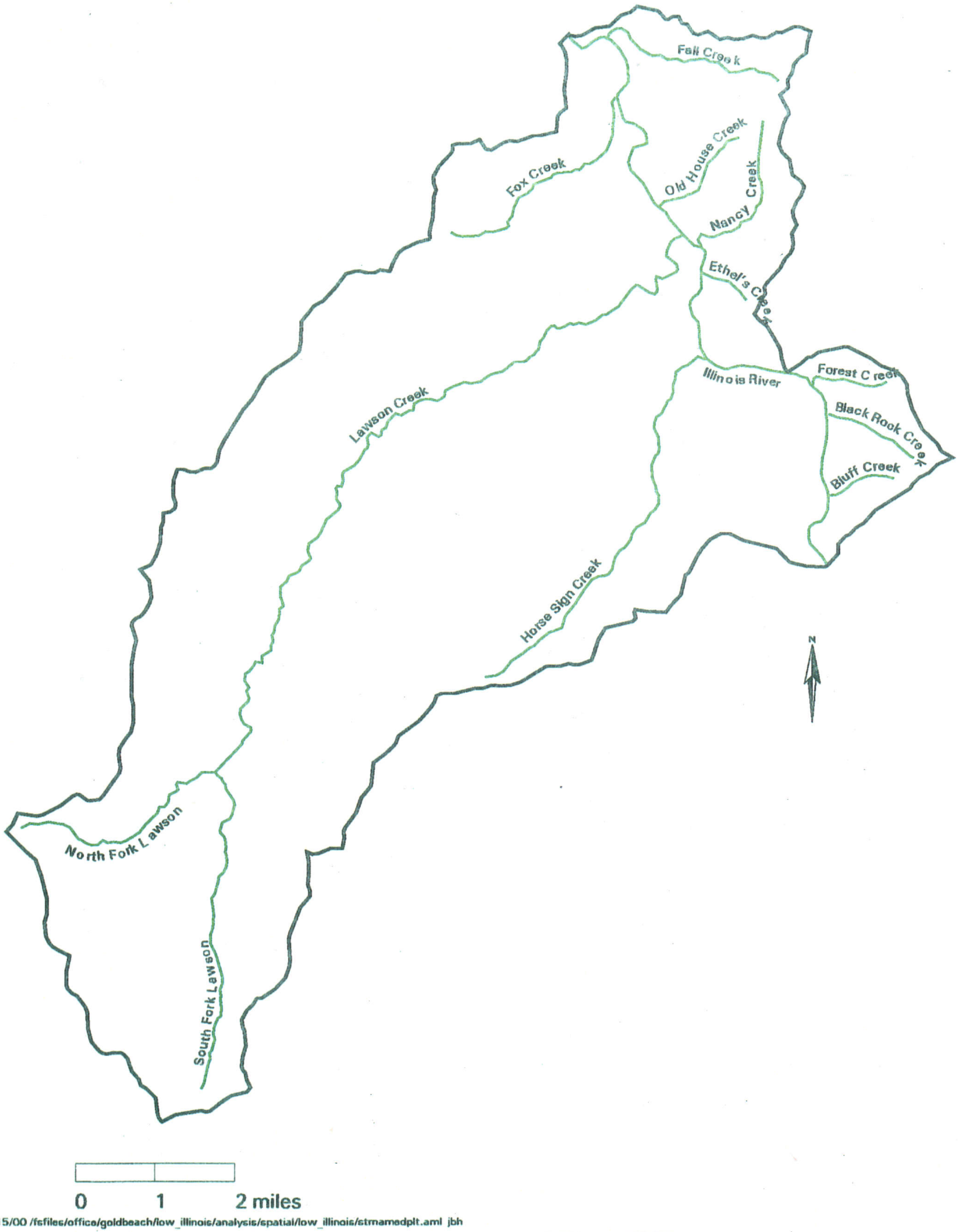
Site Map



Map 3

LOWER ILLINOIS WATERSHED

Named Streams



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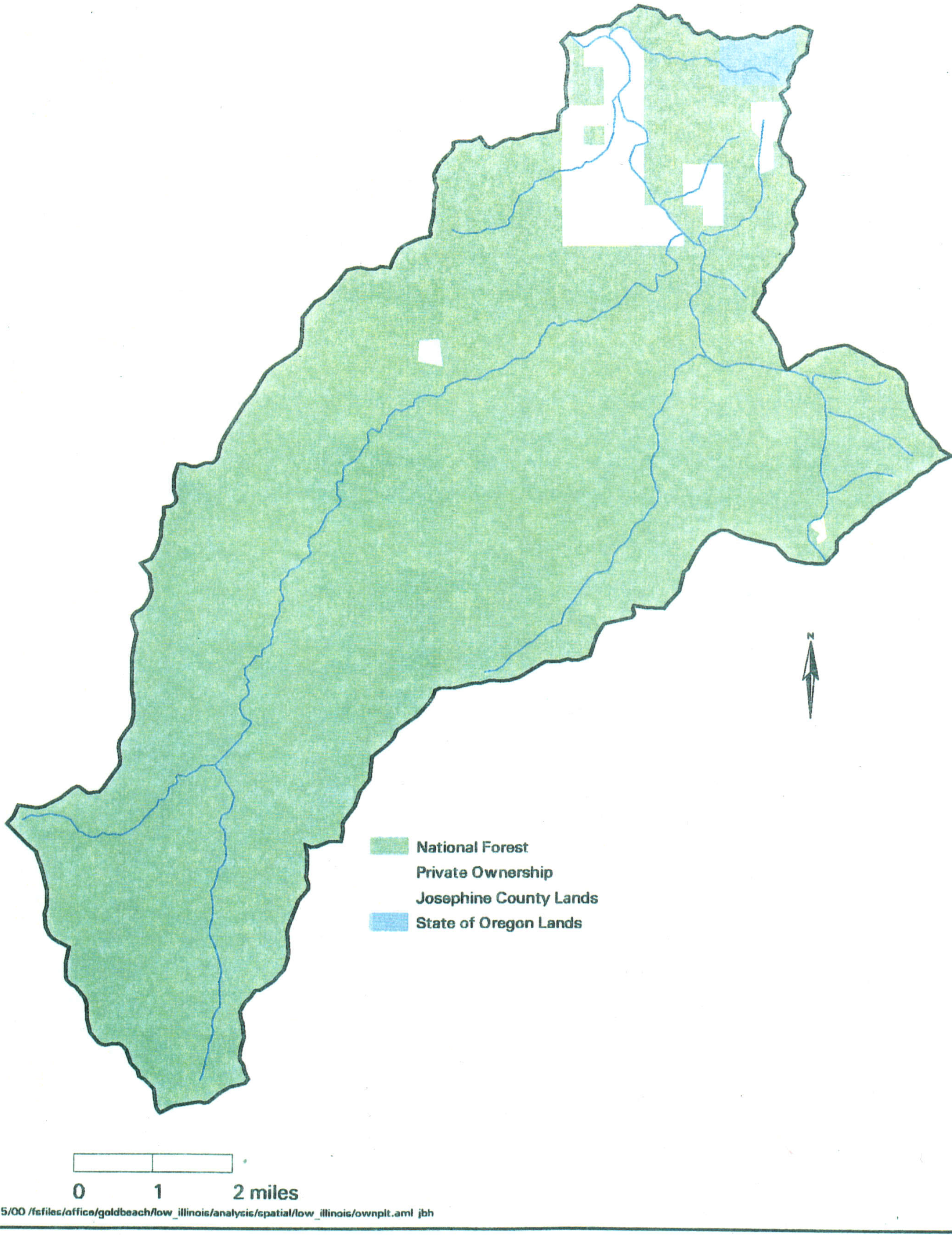
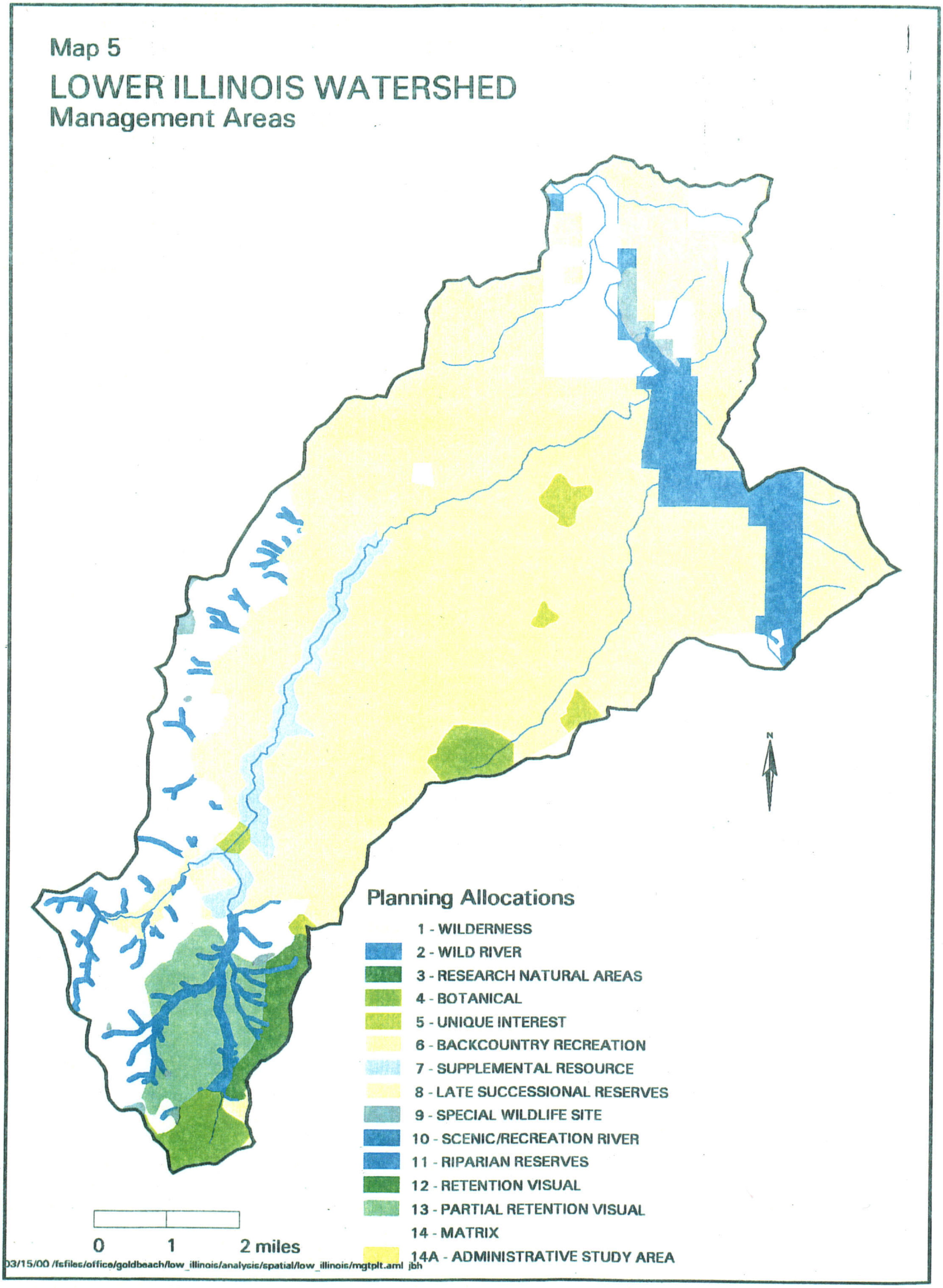
MAP 4

LOWER ILLINOIS WATERSHED

Land Ownership




Map 5
LOWER ILLINOIS WATERSHED
Management Areas
N
Planning Allocations
1 - WILDERNESS
2 - WILD RIVER
3 - RESEARCH NATURAL AREAS
4 - BOTANICAL
5 - UNIQUE INTEREST
6 - BACKCOUNTRY RECREATION
7 - SUPPLEMENTAL RESOURCE
8 - LATE SUCCESSIONAL RESERVES
9 - SPECIAL WILDLIFE SITE
10 - SCENIC/RECREATION RIVER
11 - RIPARIAN RESERVES
12 - RETENTION VISUAL
13 - PARTIAL RETENTION VISUAL
14 - MATRIX
14A - ADMINISTRATIVE STUDY AREA
0
1
2 miles
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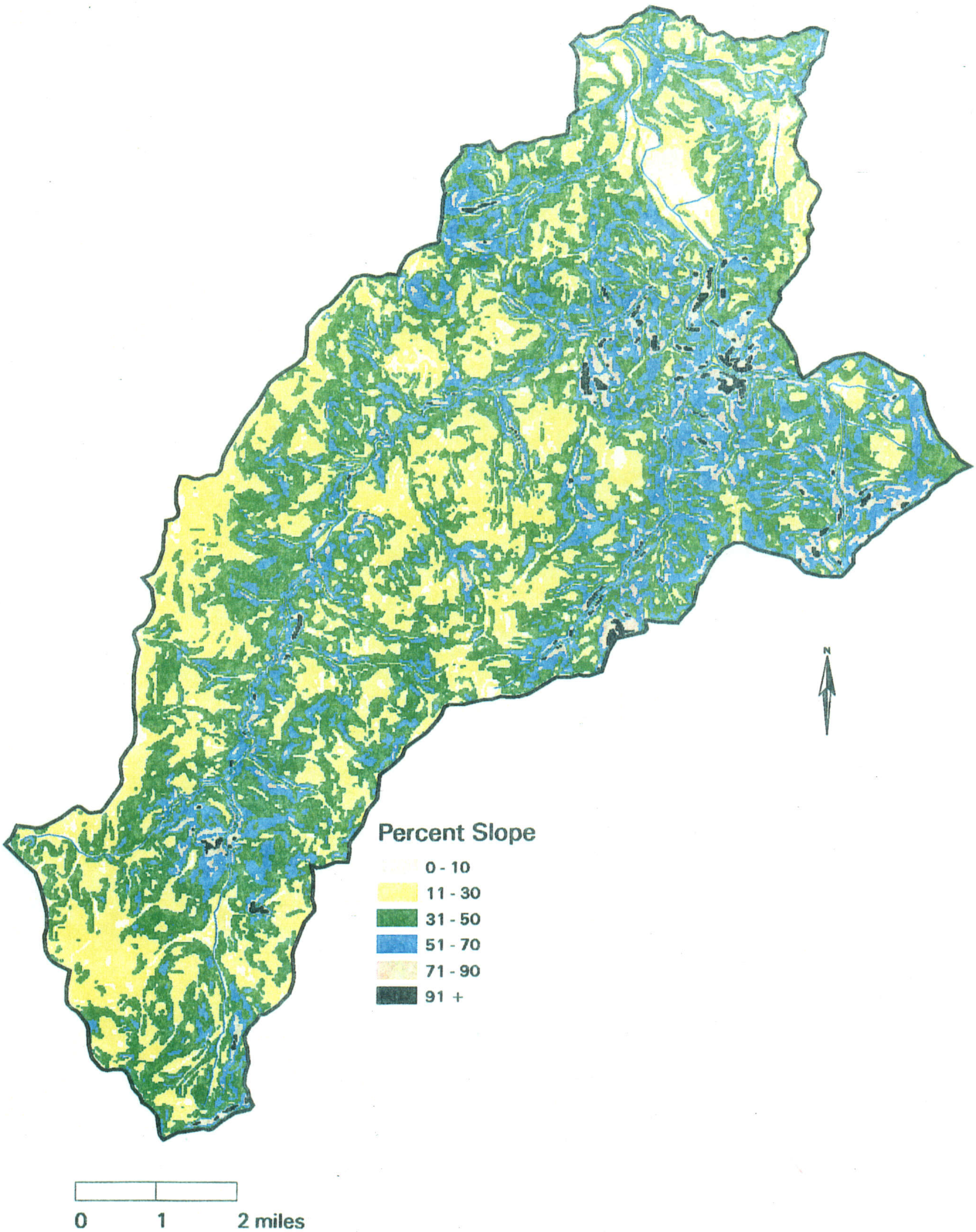
Map 6

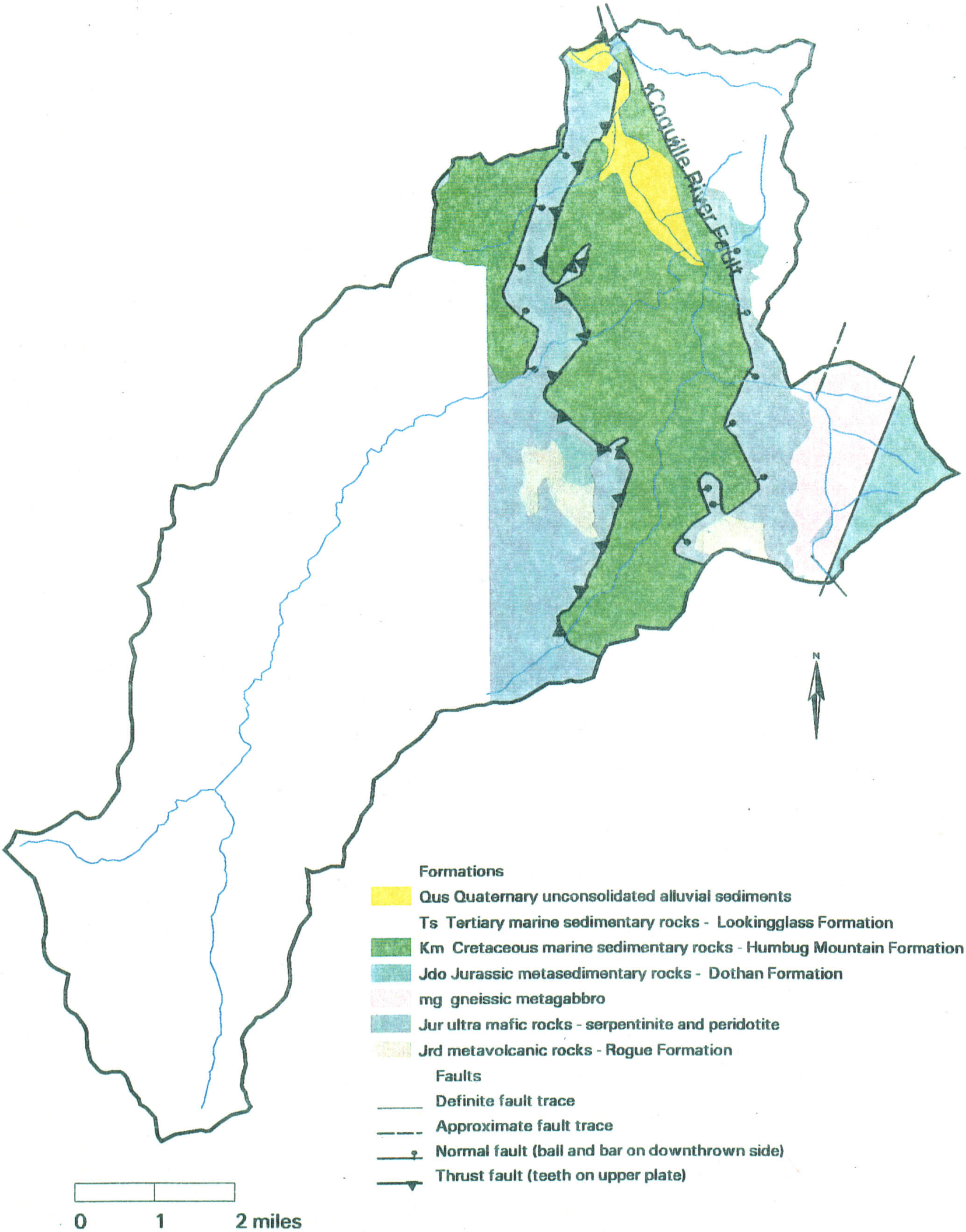
LOWER ILLINOIS WATERSHED

Slope Classes



03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/slopeplt.aml jbh

Map 7
LOWER ILLINOIS WATERSHED
Geology



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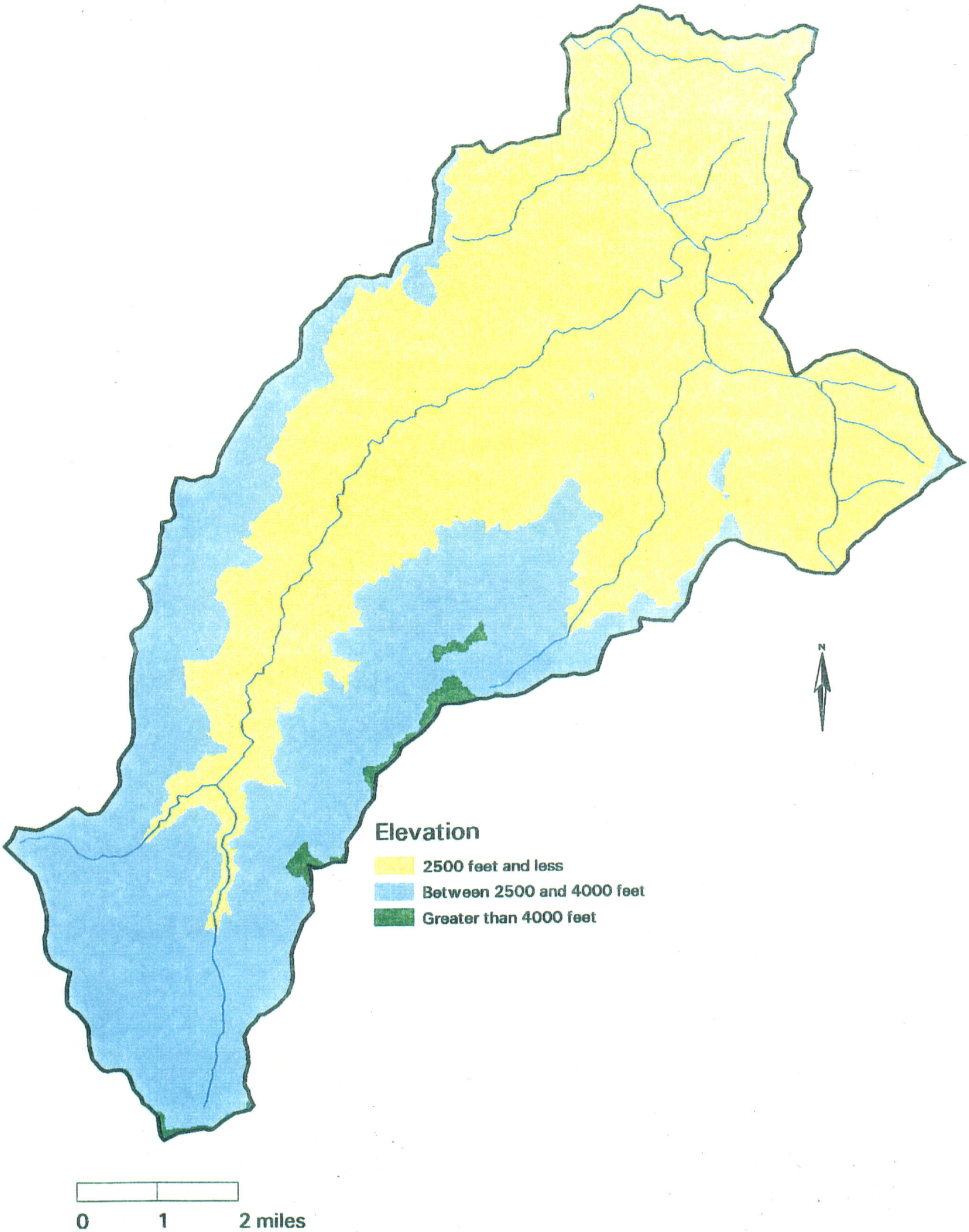
Map 8
LOWER ILLINOIS WATERSHED
Elevation Zones



03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/elevplt.aml jbh

Map 9

LOWER ILLINOIS WATERSHED

Subwatersheds and Streams

03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/strplt.aml jbh

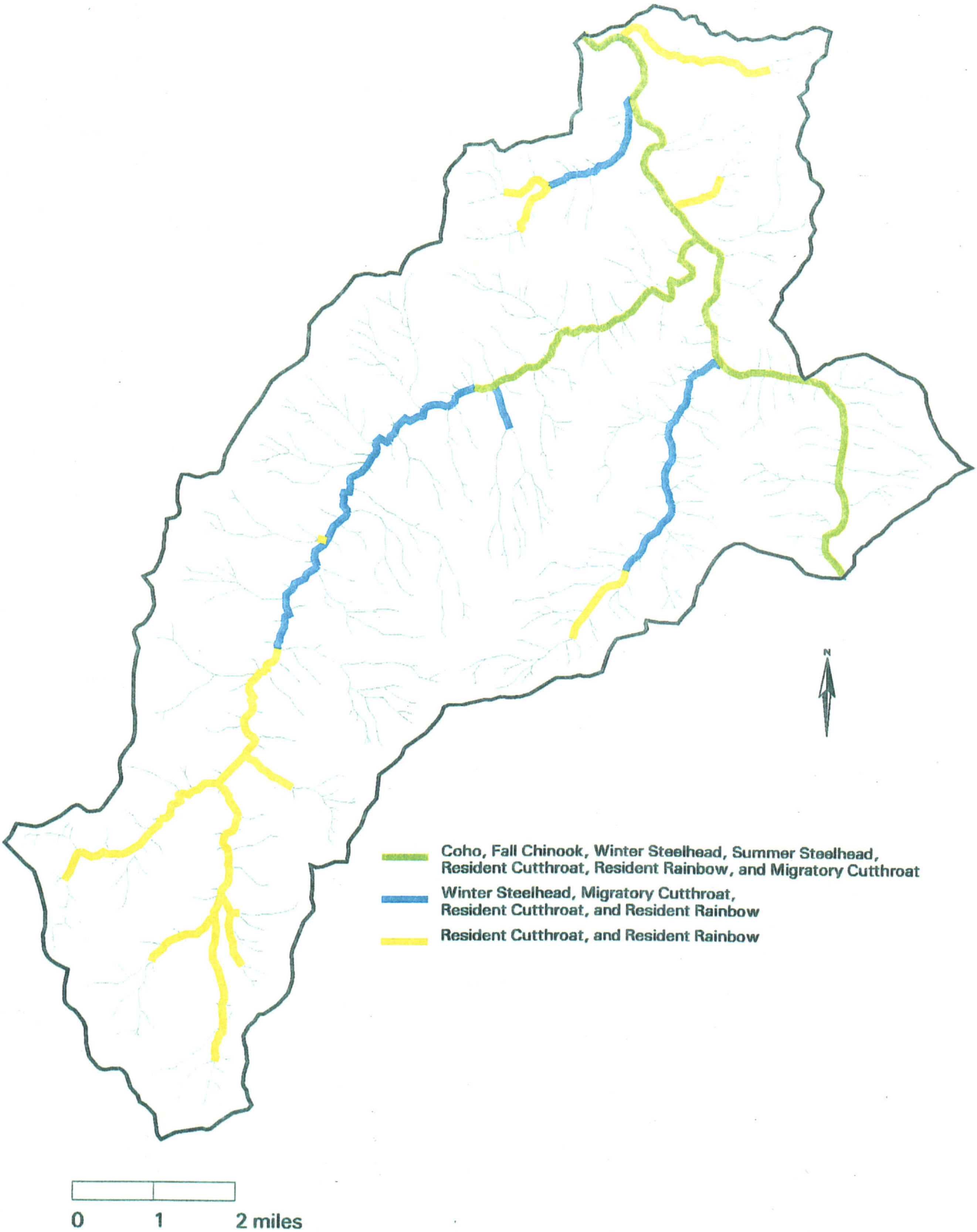
Map 10
LOWER ILLINOIS WATERSHED
Temperature Monitoring Sites

03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/thermplt.aml jbh

Map 11

LOWER ILLINOIS WATERSHED

Salmon and Trout Distribution

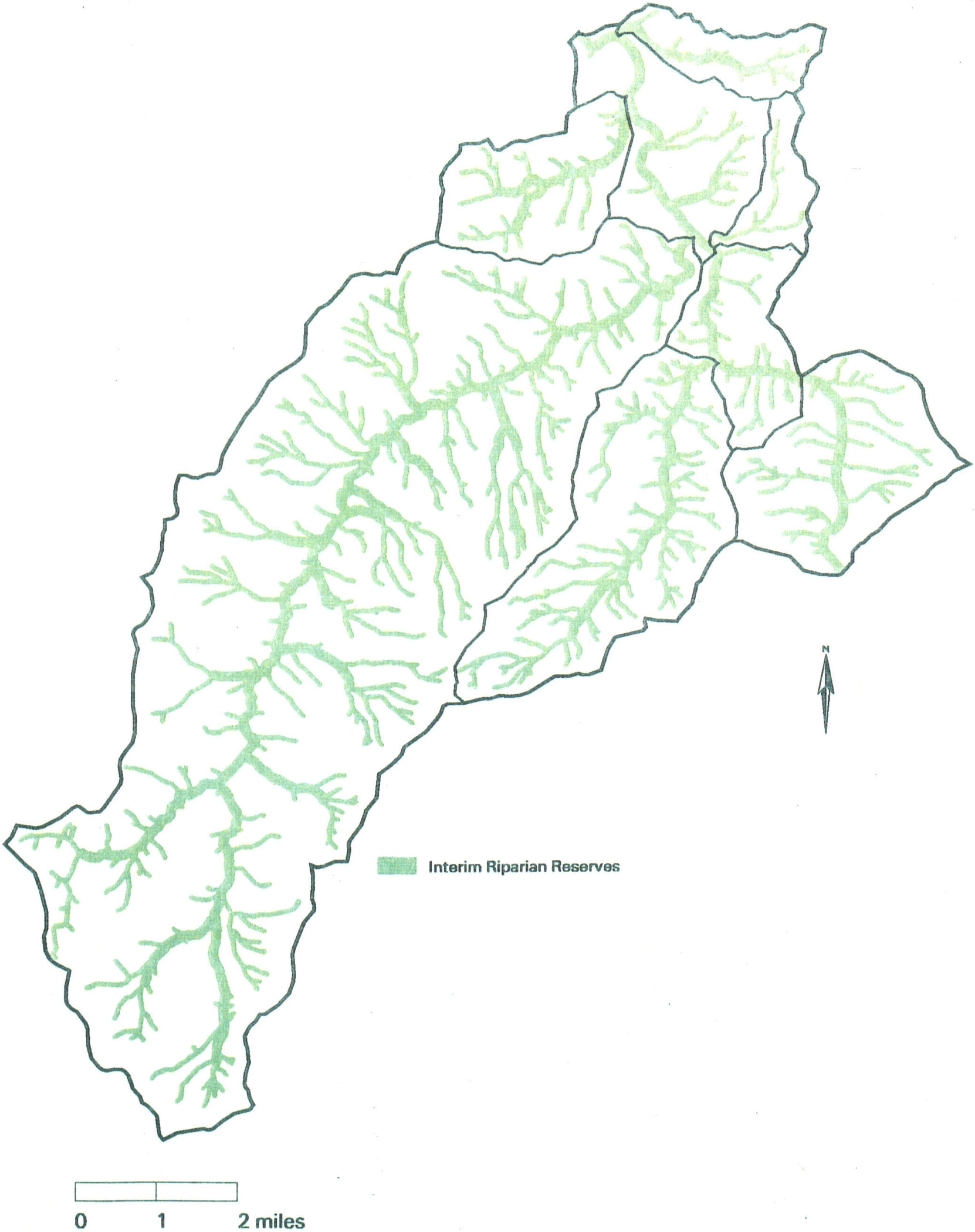


03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/fishplt.aml jbh

Map 12

LOWER ILLINOIS WATERSHED

Riparian Reserves

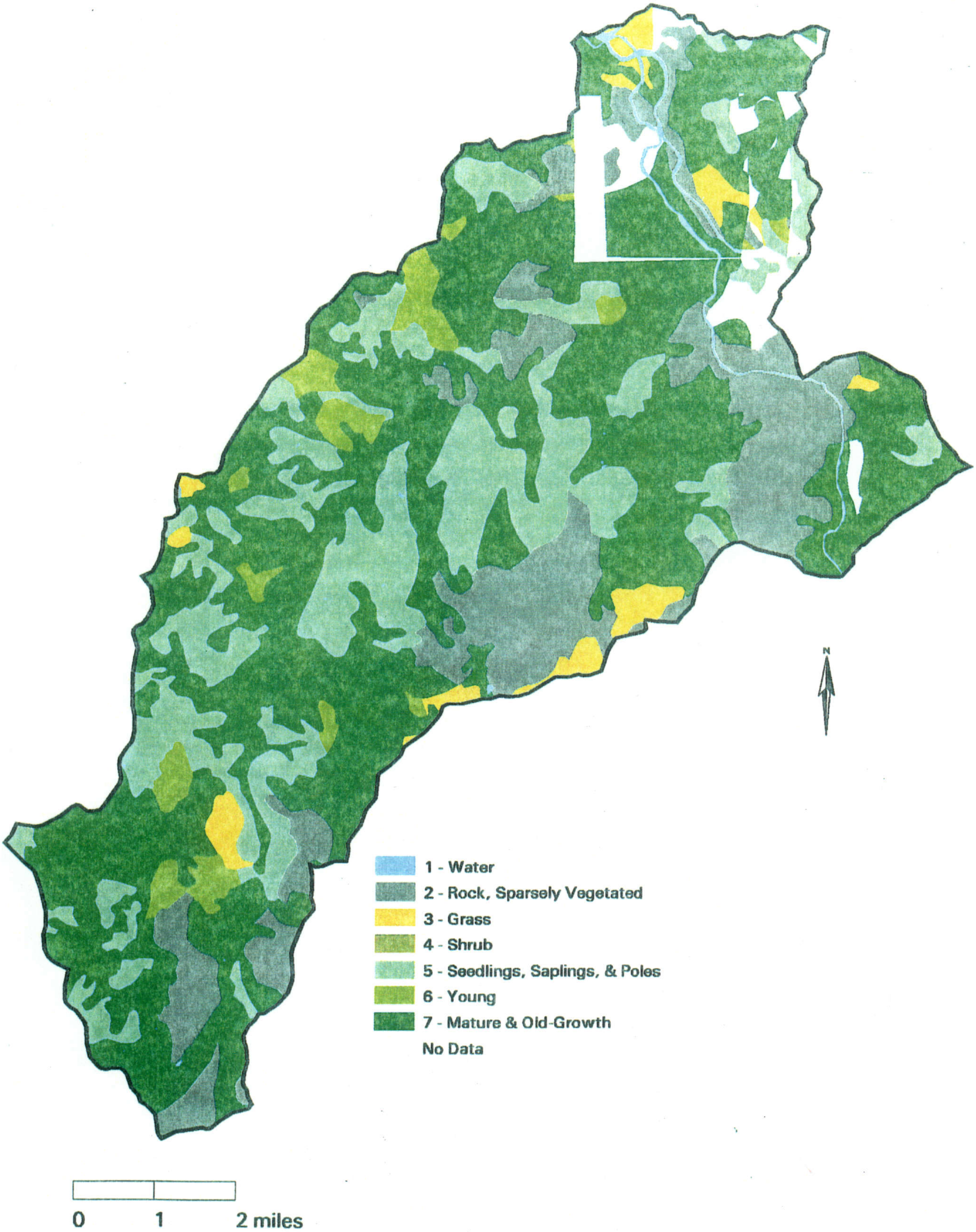


03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/rrplt.aml jbh

Map 13

LOWER ILLINOIS WATERSHED

1940 Vegetation

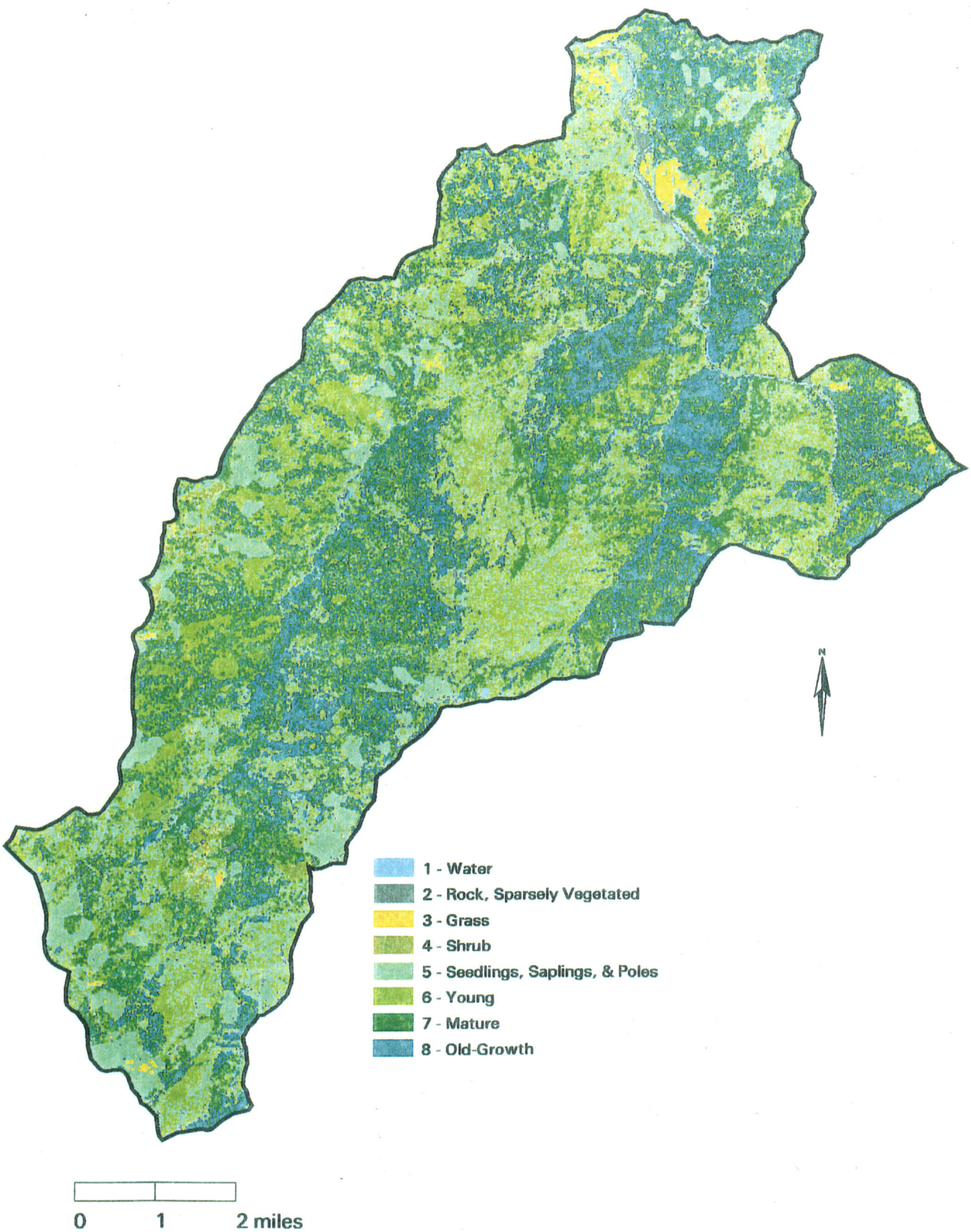


03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/veghistplt.aml jbh

Map 14

LOWER ILLINOIS WATERSHED

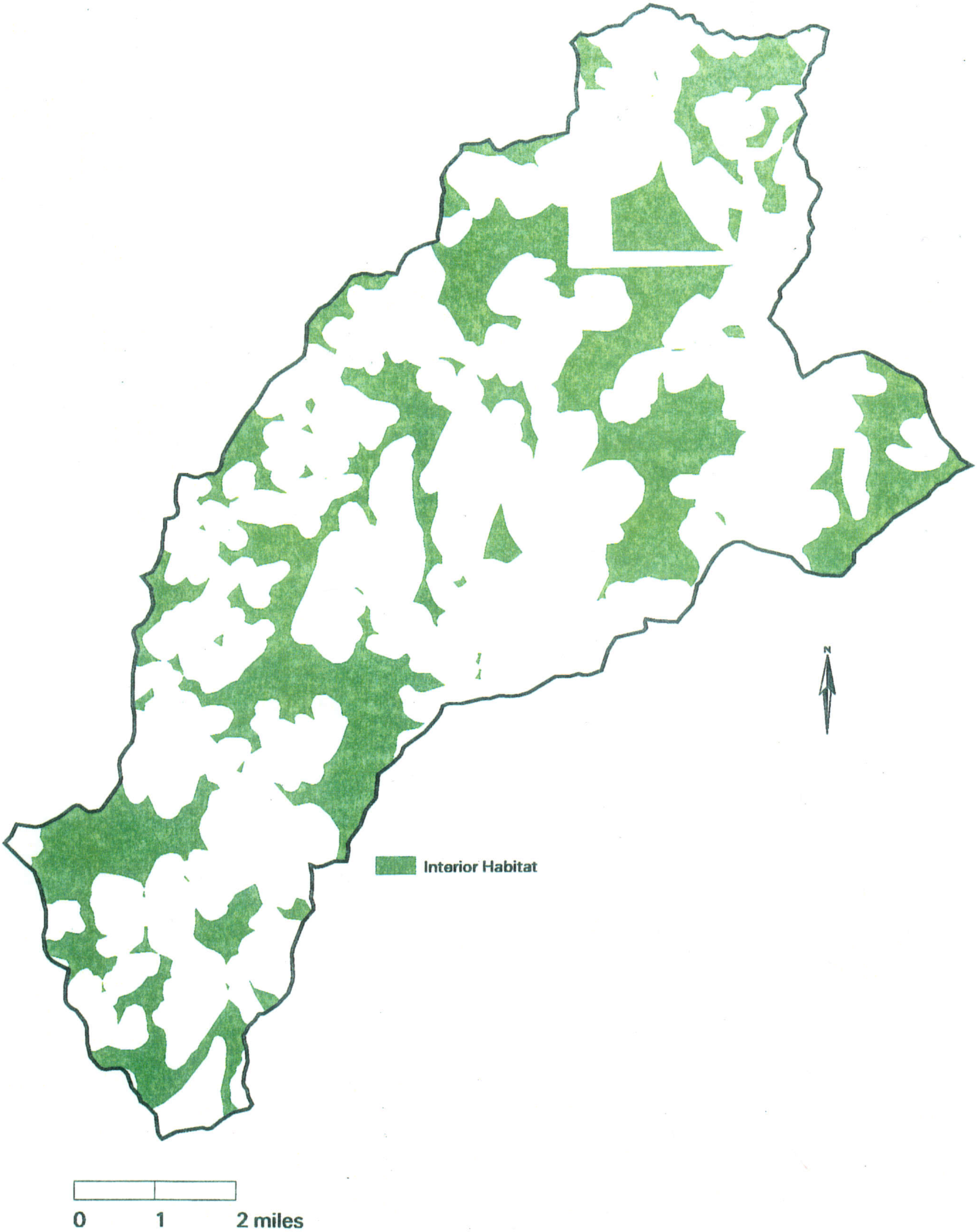
Seral Stages



03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/vegserplt.aml jbh

Map 15

LOWER ILLINOIS WATERSHED
1940 Interior Late-Successional Habitat

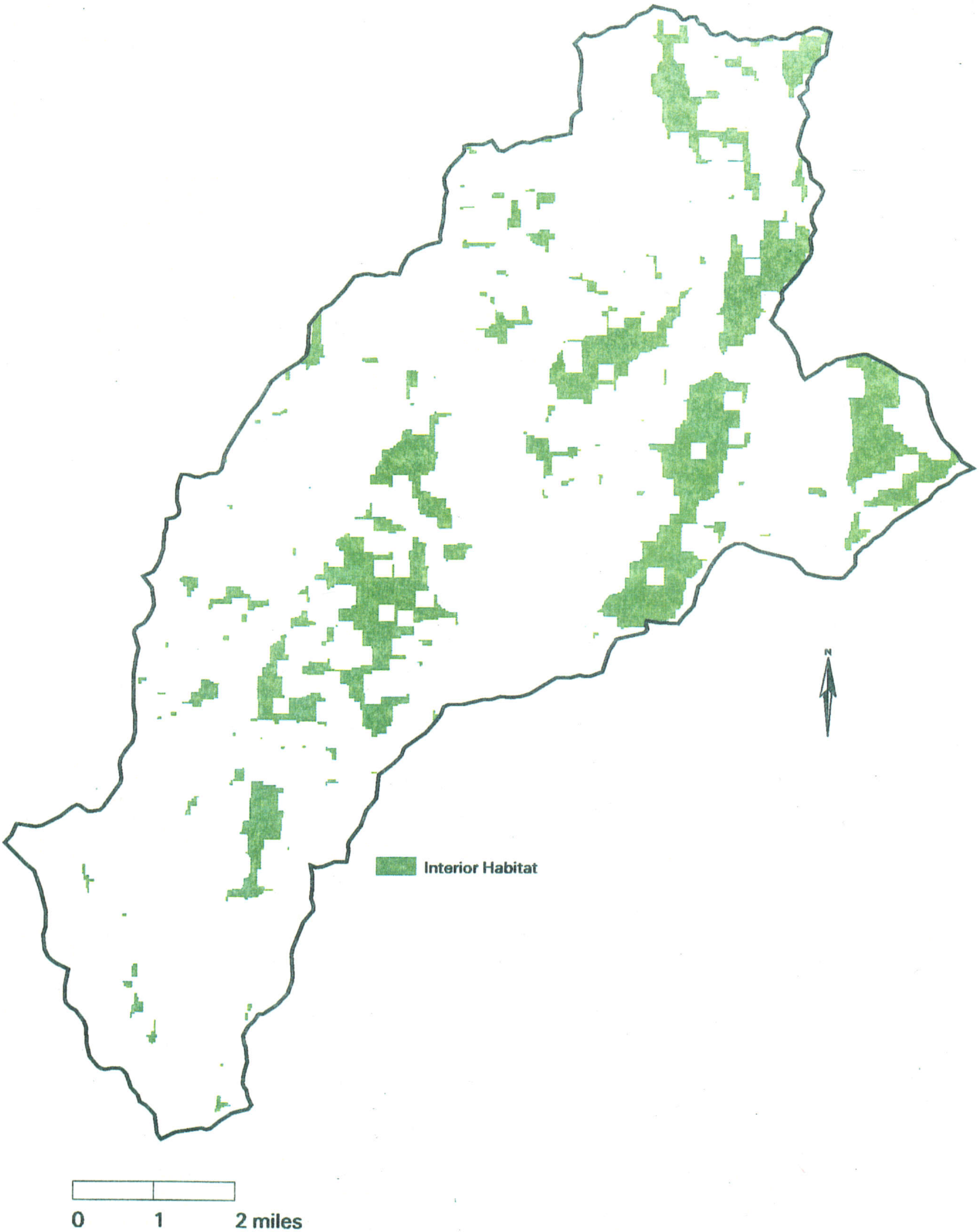


03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/habpastplt.aml jbh

Map 16

LOWER ILLINOIS WATERSHED

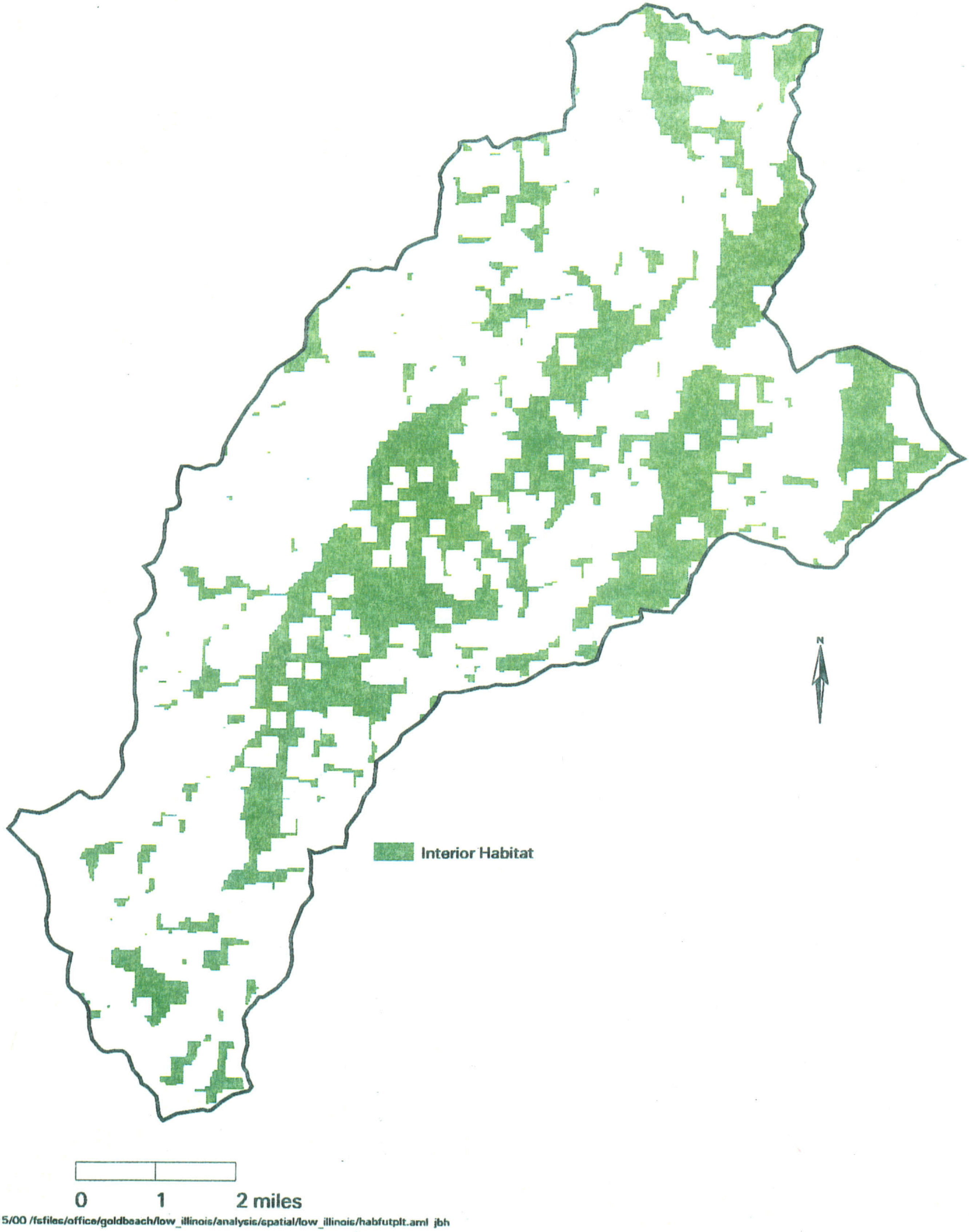
1995 Interior Late-Successional Habitat



Map 17

LOWER ILLINOIS WATERSHED

Projected 2040 Interior Late-Successional Habitat



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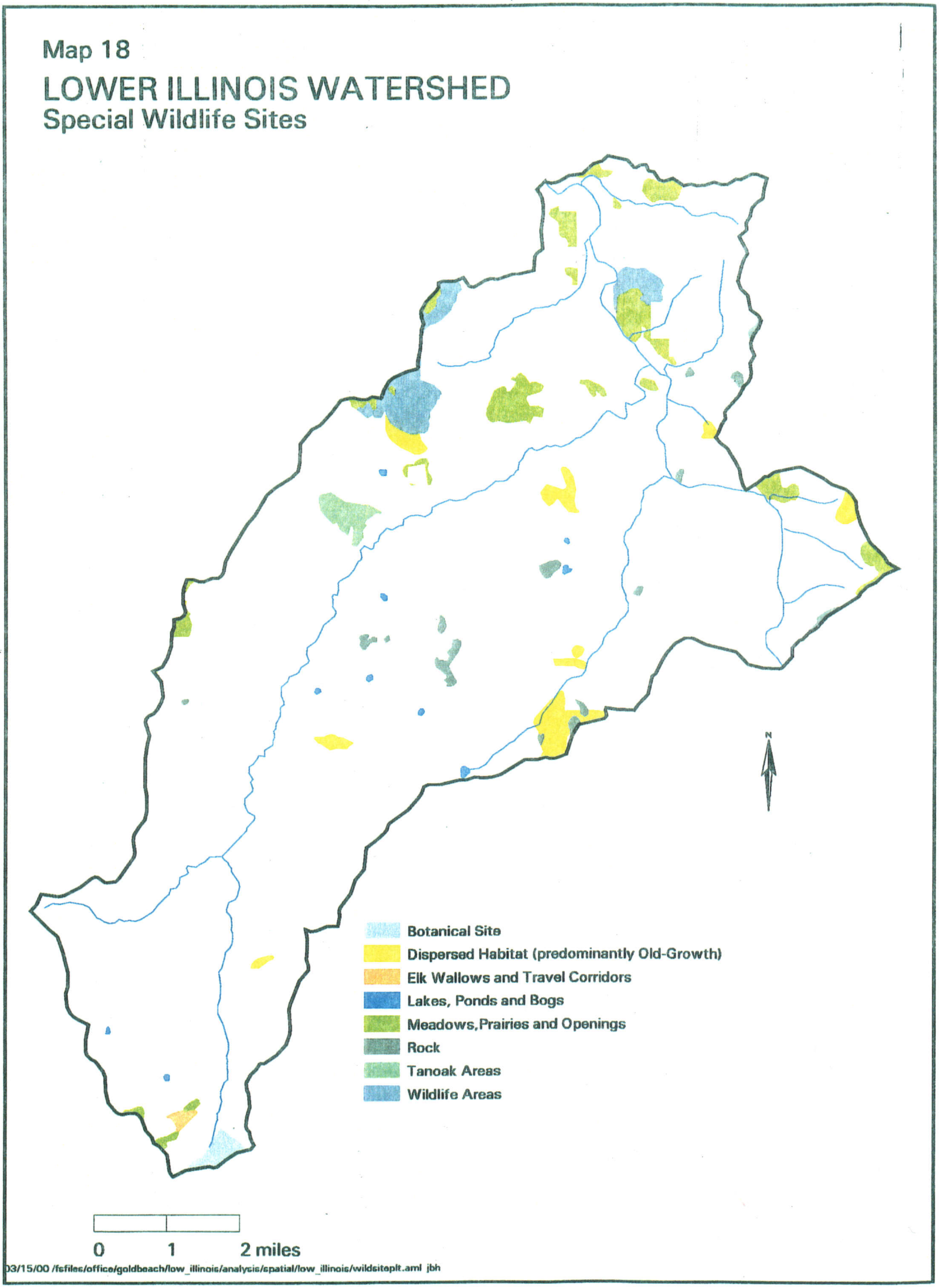
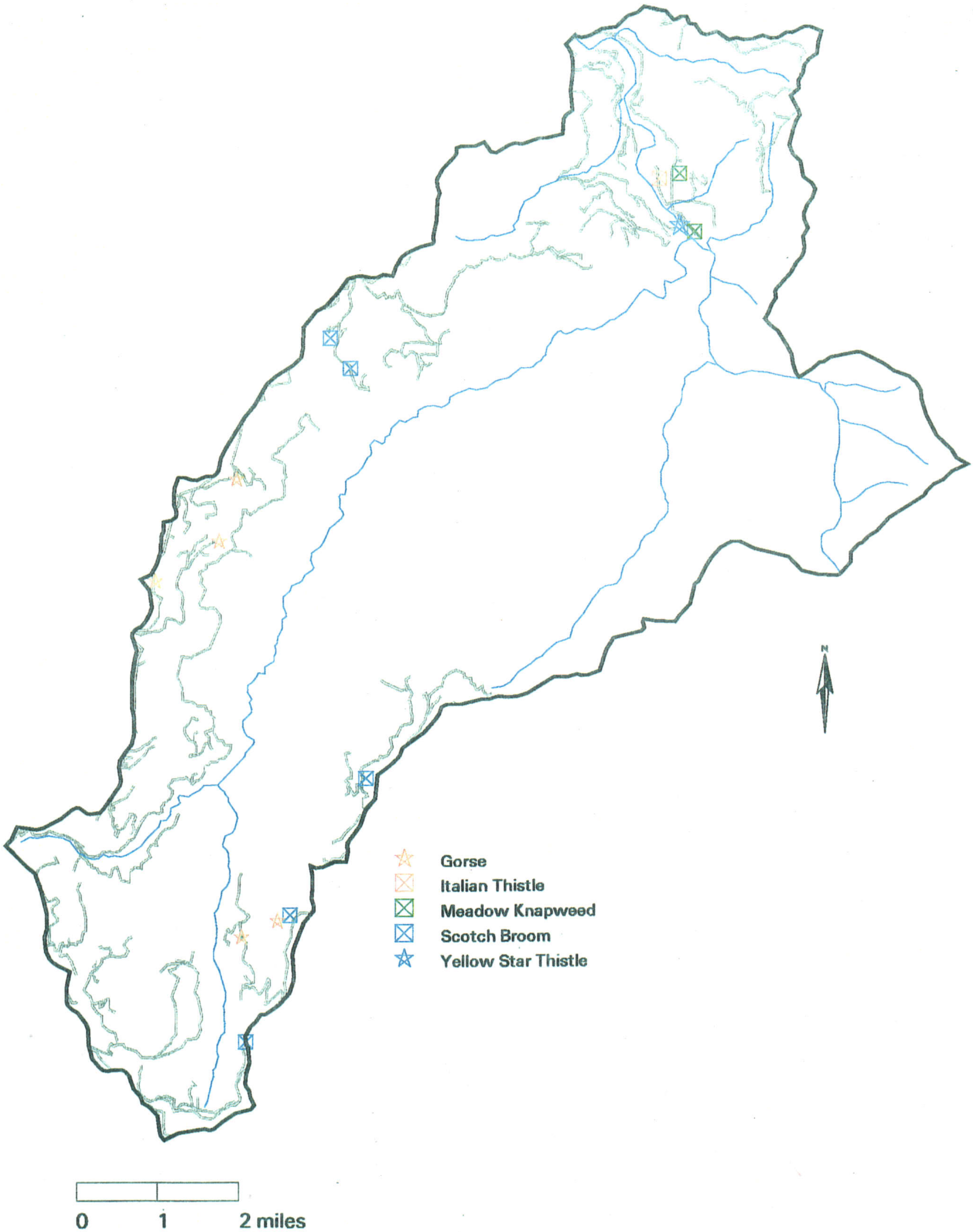

Map 18
LOWER ILLINOIS WATERSHED
Special Wildlife Sites
Botanical Site
Dispersed Habitat (predominantly Old-Growth)
Elk Wallows and Travel Corridors
Lakes, Ponds and Bogs
Meadows, Prairies and Openings
Rock
Tanoak Areas
Wildlife Areas
N
0
1
2 miles
03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/wildsiteplt.aml jbh

Map 19

LOWER ILLINOIS WATERSHED

Noxious Weed Sites

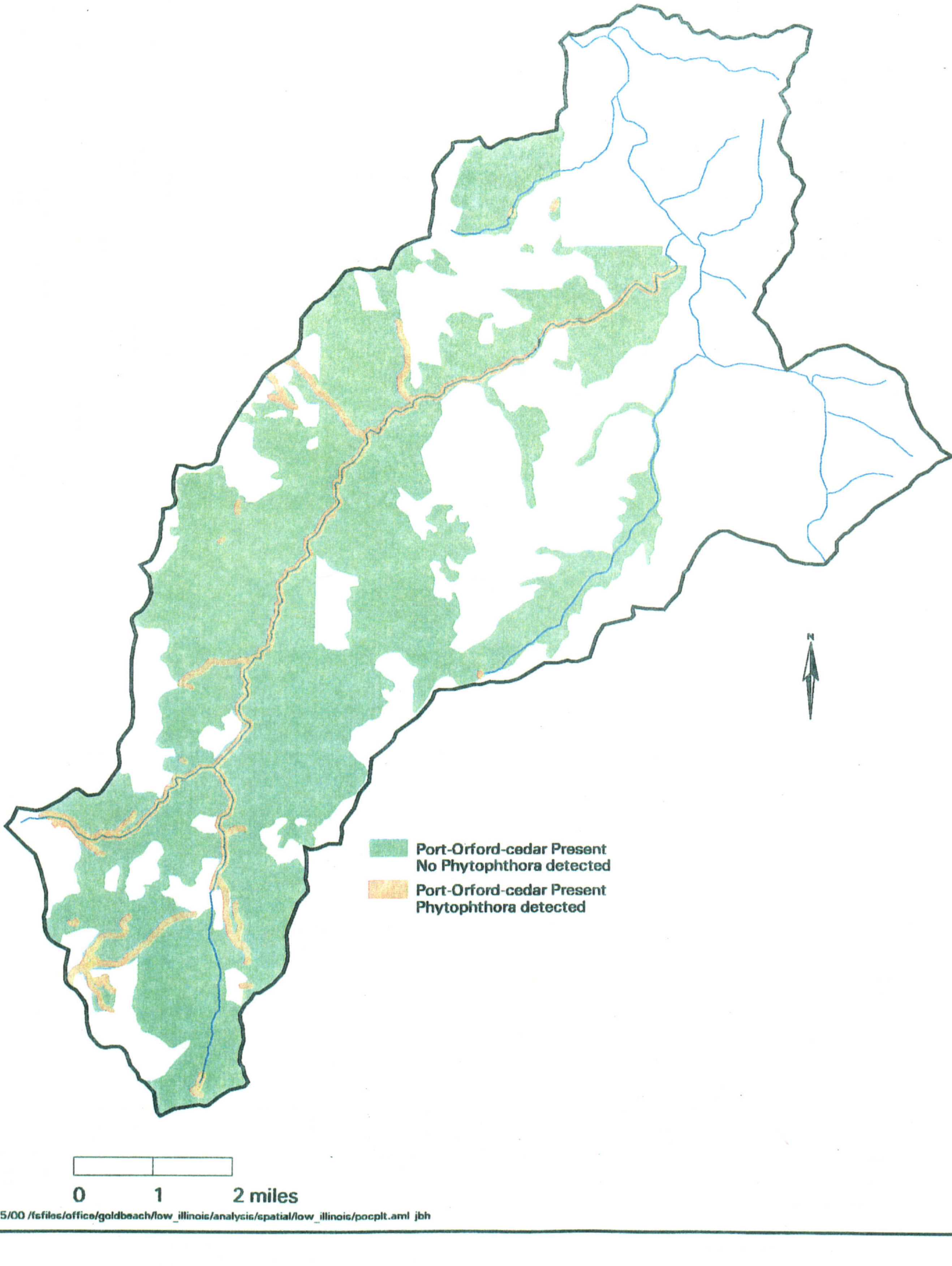


03/15/00 /fsfiles/office/goldbeach/low_illinois/analysis/spatial/low_illinois/weedplt.aml jbh

Map 20

LOWER ILLINOIS WATERSHED

Port-Orford-cedar Distribution



Map 21

LOWER ILLINOIS WATERSHED

Managed Stands & Roads

(Does not include commercially thinned or partial-cut managed stands)